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***The implementation challenge of smart specialisation
innovation strategies in catch-up regions: The role of
institutions, governance and capacity building***

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Abstract

This thesis examines public policy implementation in catch-up regions through the analytical lens of Smart Specialisation Strategies (S3). Smart specialisation is a regional innovation strategy, introduced in 2010 as the main European cohesion policy to promote economic convergence. Empirical research shows that catch-up regions encounter major difficulties in putting S3 theory into practice. The need to understand why S3 development cannot be taken for granted, brings into focus the implementation challenge of smart specialisation, which is currently associated with weaknesses in building responsive governance models, thick institutions and strong research capabilities for innovation-driven growth.

This study investigates S3 challenges in two European catch-up regions: Crete and Central Macedonia. It builds upon a conceptual framework that brings together elements from regional innovation studies with institutional and capacity building theories, aiming to investigate public policy implementation barriers in two Greek regions which have been in fiscal crisis for over a decade. It suggests that S3 barriers derive from a much wider knowledge gap in regional studies, already existing before the introduction of smart specialisation as a development strategy. This gap rests on the lack of empirical understanding of what governance and institutional change is required in lagging regions to tackle the regional innovation paradox: how change impacts on economic growth, when change must be initiated to be feasible and realistic, and what capabilities are needed to support change for regional renewal and development. To operate the conceptual framework, a qualitative case study approach has been designed, using evidence from academic, public and private local actors with a key role in developing S3. Primary data were collected by means of fifty semi-structured interviews; participant observation was also used as a complementary method. Secondary data were gathered from a detailed documentary analysis of official textual sources.

The thesis demonstrates the implementation challenge of smart specialisation, extending previous studies which examine S3 development in lagging regions. In contrast to much literature, it shows that S3 barriers are not simply due to weakness of catch-up regions to build research capacities, but also to non-smart specialisation-related barriers, yet highly influential on policy implementation. Such barriers include critical mass accumulation problems, public-sector administrative burden and lack of public-private trust. They are institutional and capacity building-related, and they should not be seen, in conceptual terms, as a precondition to effective S3 implementation. Rather, they are the result of a concurrent existence of weak policy governance models, limited institutional autonomy for regional self-governance and lack of transformative capacities for structural shifts.

Two contributions to knowledge are made. Firstly, the research contributes to bottom-up theoretical understanding of regional policy development by showing that S3 debate should no longer be just about improving research capacities, but about how to best understand and address opportunities and challenges emerging from bringing together institutional integration, policy governance advances and capacity building improvements. Particularly, it evidences that S3 challenge needs to be examined and understood through a concurrent analysis of the ways in which governance, institutions and capabilities embedded in the wider environment of a region are related and evolved. Secondly, it contributes to the further advancement of regional studies, by providing a practical understanding of how to best develop S3 in practice. A three-stage policy implementation model is developed to support innovation strategists to search for an S3 implementation mix that best corresponds to their own needs.

Declaration of originality of submitted work

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own.



George Papanichail

Signed:

Date:

To Kiki

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Abbreviations

BERD	Business Enterprise R&D Expenditure
CM	Central Macedonia
DTC	Directorate of Transport and Communications
ELSTAT	Hellenic Statistical Authority
EPO	European Patent Office
EC	European Commission
ERA	European Research Area
ESRC	Economic and Social Research Council
EU	European Union
FORTH	Foundation for Research and Technology
FP7	7th Framework Programme
FYROM	Former Yugoslav Republic of Macedonia
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GSRT	General Secretariat for Research and Technology
ICT	Information and Communications Technology
NIS	National Innovation System
NUTS2	Nomenclature of Territorial Units for Statistics, level 2
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
RIC	Regional Innovation Council
RIM	Regional Innovation Monitor
RIS	Regional Innovation System
RIS3	Regional Innovation Strategies for Smart Specialisation
RQ	Research Question
RTDI	Research, Technology Development and Innovation
S&T	Science and Technology
S3	Smart Specialisation Strategies
SMEs	Small and medium-sized enterprises
STEP-C	Science and Technology Park of Crete
STI	Science, Technology and Innovation
T&I	Technology and Innovation
TMF	Technologically-mature Firms
TT	Technology Transfer
TTO	Technology Transfer Office
ZLC	Zero-level Capability Firms

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Chapter 1: Introduction

1.1 Background

This PhD journey was inspired by my enthusiasm to investigate and understand the process in which regions change, diversify and evolve, and it became a reality thanks to funding provided by the Economic and Social Research Council (ESRC). Its beginning coincided with the start of a growing debate about the relatively new, at that time, concept of smart specialisation. Interestingly, an increasing number of studies, initially within, and later beyond the boundaries of the European Research Area (ERA), started investigating regional renewal and development through the analytical lens of smart specialisation.

Smart specialisation is a contemporary innovation strategy for innovation-driven growth, introduced as an academic concept in regional innovation studies in the mid-to-late 2000s (McCann and Ortega-Argilés 2015). Originally, it was launched as a sectoral and industrial policy with deep and grounded theoretical origins in neoclassical economic theory. The genesis of the concept can be traced back to the work of *Knowledge for Growth-K4G* (OECD 2013), an EU expert group aimed to foster a pan-European knowledge generation and diffusion framework with the objective of examining the transatlantic differences between Europe and US¹ (van Ark, O'Mahony, and Timmer 2008; Ortega-Argilés 2012; OECD 2013). The interest in S3 development has been growing widely over the last years, shifting attention from sectoral and industrial planning to spatial applicability at the national and particularly at the sub-national level. Presently, smart specialisation is seen as a new strategic policy approach to regional renewal and development, aimed to address innovation in a collective and inclusive social manner (Marques and Morgan 2018). It is based on a simple rationale which promotes a policy-prioritisation process in which regions use their own resources

¹ The 'transatlantic productivity gap' refers to the European economies which were falling behind the North American economies; (Ortega-Argilés 2012)

to develop entrepreneurial search capabilities to support regional renewal and development (Foray 2014). Its principles rely on the idea of structural change and regional realignment (Kyriakou et al. 2016; OECD 2013; Foray 2012); institutional transformation (McCann and Ortega-Argilés 2014; Grillitsch 2015); agglomerations and knowledge spill overs (Thissen et al. 2013); and entrepreneurial experimentation and diversification (Boschma and Gianelle 2014).

Research into smart specialisation intensified from 2010 onwards, when smart specialisation strategies (S3) were introduced as the main regional innovation strategy in the Innovation Union EU flagship initiative (EC 2012). Currently, S3 is the mainstream EU cohesion policy for economic convergence among European regions, and it constitutes a powerful regional tool for place-based innovation-driven growth. Motivated by a number of new, dominant research trends in regional development, S3 became the main unit of analysis in this thesis.

However, while S3 research has recently contributed to understanding smart specialisation's theoretical underpinnings at the regional level (Capello and Kroll 2016; Foray 2016), a growing number of researchers had also begun to argue that many European regions experience major difficulties in turning their S3 ideas into practice. The investigation to understand why S3 implementation was challenging and uncertain at the regional level (Thissen et al. 2013; Landabaso 2014; Capello 2014), brought into focus the so-called *implementation challenge of smart specialisation* (Morgan 2015). The S3 challenge is currently linked to the weakness of less-advanced regions in implementing regional innovation strategies (Rodriguez-Pose and Wilkie 2015; Kroll 2016), and constitutes one of the most critical knowledge gaps of the S3 literature. Interestingly, one of the main characteristics of the smart specialisation challenge is that it is multifaceted and its causes and effects differ noticeably across diverse EU territories with unlike regional environments. As such, challenges may range from the difficulties in conducting entrepreneurial searches to generating the critical mass needed for policy implementation.

At present, there are an increasing number of theoretical and empirical studies which seek to indicate the causes of the smart specialisation challenge in European territories. The vast majority of this work associates S3 implementation problems with the innovation paradox (Oughton, Landabaso, and Morgan 2002) and with many of the features that less-advanced European regions usually possess, e.g. fragmented innovation systems (Cooke, Gomez Uranga, and Etxebarria 1997; Tödting and Trippel 2005; Martin and Trippel 2014); weak learning capabilities and skills (Malerba 1992; Oughton, Landabaso, and Morgan 2002); significant challenges in mobilising institutional and structural change (Neffke et al. 2014); and low entrepreneurial potential (Fritsch 1992). For example, there is a growing tendency to link smart specialisation implementation barriers with the quality of institutions in weaker European regions. The underlying argument is that many of the S3 implementation challenges arise from the poor institutional environment of the less-advanced regions (McCann, van Oort, and Goddard 2016; Rodriguez-Pose and Wilkie 2015; Gianelle et al. 2016; Morgan 2013; McCann and Ortega-Argilés 2014; Foray and Goenaga 2013), which hinders the process of putting their innovation strategies in place. This view highlights the role of increasing regions' institutional capacity in shaping S3 implementation dynamics (Sörvik et al. 2016; Grillitsch 2015; Asheim, Grillitsch, and Trippel 2016).

Other studies underpin that institutions are only one important aspect of the smart specialisation dynamics, suggesting that multi-level governance and policy implementation capabilities are also increasingly relevant for S3 development (Gianelle et al. 2016; Kyriakou et al. 2016; Iacobucci and Guzzini 2016; Rodríguez-Pose and Garcilazo 2015; Landabaso 2014; McCann and Ortega-Argilés 2014). For instance, it was argued lately that regions with ineffective governance structures are indeed experiencing difficulties in implementing S3 (Reid and Stanovnik 2013), while, on the contrary, good multi-level policy governance models are more likely to support the development of a more integrated S3 framework for regional renewal and

development (Kyriakou et al. 2016; OECD 2017a), as they are seen as an underlying condition, necessary for modern public administration (EC 2014b). In a quite similar way, other studies perceive policy implementation capabilities as a precondition for policy implementation (Bachtler et al. 2017), and recognise the existence of different capacity building forms, e.g. administrative capacity, transformative capacity, absorptive capacity, and technology and innovation capacity, as a key driver of S3 implementation and development (McCann and Ortega-Argiles 2013a; Foray 2014; Baier, Kroll, and Zenker 2013b).

Given that catch-up regions usually have institutionally weak environments (Rodríguez-Pose 2013), lack well-developed governance systems (OECD 2013), and their potential to build capabilities for renewal and development is limited (Neffke et al. 2014), S3 implementation is still an open issue in weaker European environments, raising a number of interesting questions for the S3 debate. For example, a number of scholars (McCann and Ortega-Argilés 2016b; Kroll 2016; Foray 2016; Capello and Kroll 2016; Kyriakou et al. 2016) raise several questions including the following: what specific governance and institutional reforms do really matter for the implementation of S3 in catch-up regions? How can such reforms affect the realisation of S3 in less-developed regions, and what is the extent to which they must be made? Similar sets of questions arise if attention is primarily given to the capacity building aspect. For instance, what types of capacity building forms are most appropriate for less-developed regions in order to put S3 implementation in place? Does a combination of different capacity building forms impact S3 development better? What pre-existing capacities must be improved and what new capacities must be built to maximise the effects of smart specialisation policies? What is the extent to which these capacity building adjustments must be made in catch-up regions? All these research questions address ongoing challenges and gaps directly related to the implementation of S3, and become a core unit of analysis in the S3 debate which seeks to inform S3 implementation in catch-up

European regions. This thesis seeks to contribute to this debate, and sets specific aims, objectives and research questions to drive its empirical study.

1.2 Aim, objectives and research questions

Aim and research objectives

This thesis investigates the implementation challenges of S3 in catch-up regions. Its aim is to contribute to translating smart specialisation theory (design) into practice (implementation), by understanding how S3 can be effectively implemented in weak regional environments. To accomplish this aim, both general and specific research objectives are set in this thesis. Its general research objective is to study the implementation challenge of S3 in catch-up regions, which have been at the top of the EU cohesion policy agenda (EC 2014c). Research focus is primarily on Southern European catch-up regions, given their prolonged economic recession, thin institutions and profound difficulties in implementing S3 (Landabaso, Komninos, et al. 2014). Its specific research objective is to investigate and understand empirically how governance, institutions and different forms of firms' and regions' capabilities can impact S3 practices in two Greek regions (Crete and Central Macedonia), which have been in fiscal crisis for over a decade. This latter objective is linked to the ongoing S3 debate which highlights the increasing role of governance and institutional capacity in S3 development. In particular, it seeks to understand empirically the way in which smart specialisation implementation can be favoured through institutional integration and capacity building. At present, the details of this dynamic process are still unknown and constitute a key empirical knowledge gap in regional development studies and in the S3 literature particularly (Rodríguez-Pose and Ketterer 2018; Radosevic et al. 2017). Three central questions are still open, which limit our ability to inform innovation policymaking and action in the S3 context:

- How do institutions, innovation policy governance and capacity building affect the development of S3 in catch-up regions?
- What institutional reforms and governance adjustments can support S3 development in institutionally weak regions?
- What improvements in capacity building favour institutional and governance changes for the implementation of S3, and how?

These questions are directly related to each other and highlight the importance of studying governance, institutions and capabilities which are currently seen as an important driving force of S3 policy implementation (Kyriakou et al. 2016). To address the ongoing empirical knowledge gap of S3 and meet our objectives analytically, we reformulate these general questions to three specific research questions (RQs) which aim to study S3 in Crete and Central Macedonia (hereafter CM).

Research Questions

(RQ1): In what ways did the selected Greek regions develop smart specialisation strategies?

(RQ2): How do, and can, institutional arrangements and governance reforms impact on smart specialisation practices?

(RQ3): What capabilities exist and are required to develop smart specialisation strategies in catch-up regional environments

RQ1 seeks to understand and explain the way in which S3 practices were adopted and carried out by Crete and CM. Given that there is no empirical work to reveal S3 implementation routes and behaviours in the case study regions, the objective of RQ1 is to provide the basis for building and developing the empirical investigation in the study. Particularly, it aims at understanding whether or not Crete and CM followed similar methodological approaches to implement S3, and why; what

were the practical difficulties and the main challenges for implementing S3; and what policy strategic tools have been created and used to address these challenges.

RQ2 falls into two parts. The first part "*how do [...] institutional arrangements and governance reforms impact on smart specialisation practices*" seeks to achieve an analytical understanding of regions' existing governance and institutional dynamics effect on S3 development. To meet this objective analytically, a number of sub-questions are formulated: *How is governance impacting on smart specialisation at present? Do the existing institutional arrangements facilitate the implementation of smart specialisation in practice? Have the two regions considered and introduced different types of reforms in an attempt to support the design and implementation of S3 effectively? Have such reforms already affected the ongoing smart specialisation practices, and if so in what ways?* The second part of RQ2 "*how can institutional arrangements and governance reforms impact on smart specialisation practices*" seeks to examine what additional governance and institutional reforms are still required to support the implementation of smart specialisation. The main objective of the second part is to move from *what is there* to *what is missing* and empirically to show *what is required* in terms of institutional and governance reforms in order to favour S3 implementation.

RQ3 aims at exploring and understanding how existing or new capabilities can support governance and institutional change for S3 development. Given that micro-level (firms) and meso-level (regions) competences both need to succeed in regional development, (Morgan 1997; Iammarino et al. 2012; Malmberg and Maskell 1997), RQ3 examines capacity building at the level of firm and regions. The focus is mainly on those capabilities which seem to have a direct impact on innovation policymaking and regional development: *social capabilities* (Abramovitz 1986; Ohkawa and Rosovsky 1974); *networking capabilities* (Walter, Auer, and Ritter 2006); *technological capabilities* (Kim 1980; Lall 1992); *innovation capabilities* (Kim 1997); and *absorptive capacity* (Cohen and Levinthal 1990).

1.3 Research approach and design

Case study approach

This thesis is based on a qualitative study and the empirical evidence is gathered through an in-depth case study approach. The regions of Crete and Central Macedonia (CM) have been selected as two case studies from Southern European catch-up regions. Each region constitutes one single case study and each is examined separately as a unit of analysis. The sampling strategy is purposive, considering that both regions have been hit drastically by the macro-economic crisis in Greece, which has raised additional implementation barriers to S3 (Morgan 2017); possess strong academic potential at the local level; represent a relatively higher innovation and technological profile as compared to the national average; design and implement their own regional innovation strategies; and are currently in the process of developing S3.

Data collection and analysis

To collect the data and ensure their utility and integrity, a triangulation approach was followed (Bryman 2004), using both primary and secondary sources. Primary data (both audio and textual) were collected by means of semi-structured interviews and observation. Participant observation took an ethnographic form (Fetterman 1989; Jorgensen 1989) and was carried out through direct participation in diverse S3 events, workshops and public consultations conducted for both regions in the period 2015-17. Interviewing took place in the period 2015-18. Fifty personal interviews were conducted with high-level national and regional innovation experts, academics from state universities and public-funded research centres, local entrepreneurs, and representatives from varied intermediary organisations (e.g. science parks, incubators, business networks, chambers etc). Analytically, there were 20 interviews for CM and 20 interviews for the Crete, followed by 10 additional ones (longitudinal study) conducted from August to November 2017. Given that the in-depth interviewing generated an enormous amount of textual information, NVivo (Ver.7) was used to organise and analyse the data effectively. The majority of the interviews were

transcribed, translated (from Greek to English) and inserted in NVivo for the codification process. To build knowledge of the data, interview information was allocated to specific coding schemes and meta-categories (see chapter 4 for guidance).

1.4 Thesis overview

The thesis consists of ten chapters including this introduction which sets the scene for the study. The content of each chapter is briefly summarised as follows.

Chapter 2 (Literature review) develops an analytical framework in order to review previous theoretical and empirical findings related to the development of smart specialisation strategies (S3) in the regional setting. The analysis builds on the existing regional innovation systems literature, aiming to study smart specialisation's theoretical underpinnings and to define particular experiential knowledge gaps. We focus on catch-up regions and review the way in which smart specialisation is related to other important elements of regional innovation development concepts and evolutionary economic theories. Particular attention is given mainly to theories related to capacity building, institutions and policy governance.

Chapter 3 (Conceptual framework) puts together many of the theoretical concepts and ideas discussed in the literature review. It seeks to build a conceptual framework in which the research objectives could be effectively met. Based on a synthesis of different sources of theory (institutional theory, catch-up theory, governance and capacity building theory), chapter 3 constructs an analytical framework to define a specific empirical gap and assists in refining the research goals and formulating realistic research questions.

Chapter 4 (Methodology and research design) discusses the methodological approach employed in this thesis to meet its research objectives. It provides a thorough explanation of how the conceptual framework is operationalised in particular regional contexts through the formation of three research questions. Case study selection,

research strategies and data collection methods and analysis are justified and discussed.

Chapter 5 (Setup of the regions) provides a detailed overview of the regional profiles of the case study regions. It analyses demographic, economic and social factors that have gradually influenced the productive structure of Crete and Central Macedonia over time. The chapter discusses the extent of changes occurring in the regions' socioeconomic structure before and after the financial crisis of 2008.

Chapters 6, 7 and 8 form the empirical part of the thesis and present the analytical findings emerging separately from each of the research questions.

Chapter 9 (Discussion - theoretical & empirical contributions) brings together all of the empirical findings from chapters 6, 7 and 8. An analytical discussion is set to explain how the empirical findings from the regions of Crete and Central Macedonia are linked to, or enhance previous ideas, theories and concepts presented in the literature review (chapter 2). This chapter provides a number of conclusions which lead to certain theoretical and practical contributions as to how smart specialisation development can be better understood and implemented in institutionally weak regional environments. The chapter acknowledges the importance of improving regions' research capacities for S3 implementation; however, it evidences that other non-S&T barriers, which may not be directly related to public policy implementation are also part of the S3 implementation challenge in catch-up regions.

Chapter 10 (Conclusions) provides an overall overview of the study (research problem, objectives and strategy followed, implications of findings in light of existing theory), highlights its limitations and closes with a perspective on further research emerging from this work. It evidences that the implementation challenge of smart specialisation in catch-up regions, and particularly in areas with prolonged economic recession, goes far beyond Science and Technology (S&T), as it is conditioned by multi-level politics in policy governance, institutional regulations and regional capacities, to bring about change.

Chapter 2: Literature Review - Developing a theoretical framework for smart specialisation

2.1 Introduction

In this chapter we develop an analytical framework to review both theoretical and empirical findings from previous and recent work that was published in order to study the development of smart specialisation strategies (S3) in catch-up regions. In particular, chapter 2 conducts a systematic literature review about smart specialisation with three objectives. The first is to introduce the notion of smart specialisation as a relatively new place-based territorial strategy, and to build a solid understanding as it has been conceptualised from its main advocates in recent years. It analyses the nature of its key elements (e.g. the entrepreneurial discovery) and seeks to identify and discuss a number of empirical outcomes regarding its implementation across diverse European territories. Our analysis draws attention to less-favoured regions with limited innovation capacity and potential. The second objective is to review the way smart specialisation is related to other important elements of regional innovation development concepts and evolutionary economic theories, aiming at understanding more precisely its realisation in the regional setting. Particular attention is given to theories related to capacity building, institutions and policy governance. The third objective is to identify experiential knowledge gaps which need further empirical investigation, as well as to facilitate the development of a well-structured conceptual framework to address particular research problems. Given that the conceptual framework of smart specialisation has been importantly informed in recent years (Foray 2016; Capello and Kroll 2016), empirical investigation is not meant to identify theoretical gaps, but rather practical challenges to S3 implementation.

The chapter begins with an understanding of the smart specialisation notion and provides an historical background on how the S3 paradigm has moved from national and sectoral patterns to regional approaches. This first part outlines the way smart specialisation theory is currently taking an innovation policy approach with practical effects at the regional level. Also, given that our primary focus is on understanding smart specialisation practices in less-favoured environments, a review of the main characteristics of catch-up regions is given. Two key sections follow in which implementation enablers of smart specialisation are reviewed and analysed from two different perspectives: the capacity building perspective and the institutional and governance perspective. Since S3 literature emphasises the centrality of both elements in the regional setting, we review existing theoretical and empirical findings regarding the framework in which capacity building, institutions and governance arrangements impact smart specialisation strategies.

2.2 Understanding the theoretical context of smart specialisation

Smart specialisation is a contemporary innovation strategy for regional renewal and development. It was introduced as an academic concept in regional innovation studies in the mid-to-late 2000s (McCann and Ortega-Argilés 2015). Its principles rely on the idea of structural change and regional realignment (Kyriakou et al. 2016; OECD 2013); institutional transformation (McCann and Ortega-Argilés 2014); agglomerations and knowledge spill overs (Thissen et al. 2013); and entrepreneurial experimentation and diversification (Boschma and Gianelle 2014). Smart specialisation is based on a simple rationale which promotes a policy-prioritisation process in which regions use their own resources to develop entrepreneurial search capabilities for regional renewal and development. Dominique Foray, one of the founding fathers of the Regional Innovation Strategies for Smart Specialisation (RIS3), explains that:

"The notion of smart specialisation describes the capacity of an economic system (a region for example) to generate new specialities through the discovery of new domains of opportunity and the local concentration and agglomeration of resources and competences in these domains" (Foray 2014, 1)

The discovery of economic areas, or *domains* as defined in the smart specialisation terminology (David, Foray, and Hall 2012), with existing and potential competitive advantages is based on a dynamic and continuous bottom-up identification process. In the context of smart specialisation, this process is known as *entrepreneurial discovery* (Foray and van Ark 2007), and it is closely linked with the principles of the economic self-discovery concept, introduced and discussed in the industrial policy literature by Hausmann and Rodrik (2003). While the entrepreneurial discovery process is not specific to smart specialisation itself, it advocates a differentiated approach (compared to classical work in industrial studies and economic geography), in which local entrepreneurial actors, with a broad meaning, take a dominant role in searching for business opportunities. Foray defines entrepreneurial discovery as a process of *"deployment and variation of innovative ideas in a specialised area that generate knowledge about the future economic value of a possible change"* (Foray 2014, 495). The entrepreneurial discovery is an interactive process in which regions can use their existing strengths towards diversifying their entrepreneurial activities into new or related economic areas (Boschma and Frenken 2009), to support R&D specialisation and boost regional development. Interestingly, the RIS3 does not necessarily promote the idea of a more specialised region, which risks making it vulnerable to external shocks (Coffano and Foray 2014); rather, it advocates the idea of specialised diversification in which knowledge diffusion and innovation-driven growth are seen as a key factor in constructing a regional advantage (Asheim, Boschma, and Cooke 2011) and promoting regional competitiveness in a globalising knowledge economy. In this view, smart specialisation underlines the idea of regional diversification, which is seen to have a key role in regional growth. Boschma and Gianelle (2014) define

diversification as "*an emerging process through which new activities develop out of existing ones, but the scope and outcome of this process are fundamentally affected by technological and cognitive constraints*". This definition is closely linked with the related variety literature (Boschma and Frenken 2009; Boschma and Iammarino 2009; Frenken, Van Oort, and Verburg 2007), which suggests that regions possess more opportunities to diversify into new related industries, if technological relatedness and related variety are kept at high levels. Mastroeni, Tait, and Rosiello (2013) have recently argued that in order for RIS3 to be successful, it is essential to continuously maintain the relevant variety in a region's economy.

Historically, the idea of smart specialisation goes back to 2008 when the *Growth Report* prepared by the Commission on Growth and Development highlighted the need for EU regions to conduct a self-discovery process in order to build their comparative advantages (EC 2012). As one of the pillar concepts of the *Innovation Union Flagship* initiative, the EU launched smart specialisation as a key innovation policy tool with a very promising strategic potential at the regional level. Very soon, RIS3 became a key element of the EU 2020 Innovation Union Initiative² with five main objectives (see Table 2.1). Currently, the strategic approach of smart specialisation ranks at the top of European regional innovation agenda (EU 2016; McCann 2015).

² Europe2020 strategy focuses on the development of a resource-efficient economy and prioritises the triplex smart-sustainable-inclusive growth model, Source: (EC 2012)

Table 2.1 The definition of RIS3

<ul style="list-style-type: none">i. RIS3 focus policy support and investments on key national/regional priorities, challenges and needs for knowledge-based developmentii. RIS3 build on each country/region's strengths, competitive advantages and potential for excellenceiii. RIS3 support technological as well as practice-based innovation and aim to stimulate private sector investmentiv. RIS3 get stakeholders fully involved and encourage innovation and experimentation.v. RIS3 are evidence-based and include sound monitoring and evaluation systems

Source: EC (2012)

The economic geography literature has extensively emphasised the importance of local actors in place-based policy intervention (Barca, McCann, and Rodríguez-Pose 2012; Barca 2009a). Likewise, smart specialisation's theoretical underpinnings highlight the increasingly important role that different local actors must take during the entrepreneurial discovery. In the RIS3 context particularly, an increased number of regional players from diverse stakeholder groups are expected to undertake a key strategic role in policymaking, which seems to have different but highly complementary facets. The first facet refers to the self-assessment process which aims at identifying and mapping regions' knowledge assets, competences and dynamic capabilities in specific economic domains (McCann and Oxley 2012). This process requires the creation of regionally-based entrepreneurial search mechanisms. The second requires local players to establish public-private synergies to jointly discover specific entrepreneurial opportunities within their domains. The process of setting entrepreneurial search mechanisms is interactive and by no means static. It also relies on the ability to exploit the advantages of generic technology platforms and networks,

known also as *General Purpose Technologies (GPTs)*, to regenerate the targeted domains through the co-invention of applications (David, Foray, and Hall 2012).

General Purpose Technologies in the S3 context

Concerning the effective utilisation of GPTs, Bresnahan and Trajtenberg (1995) highlighted their economic value recognising them as *engines of growth*. Similarly, later empirical findings point out that the invention and co-invention in GPTs could foster and deliver innovation (Aghion, David, and Foray 2009) and simultaneously reveal new economic opportunities in sectors of rapid technological change and globalisation (Kyriakou 2014). GPTs have a key role to play in the development of S3. Furthermore, smart specialisation proposers suggest that all EU regions, no matter what size or innovation capacity and potential, can and should have a collective role in exploiting and diffusing GPTs. Forming dynamic partnerships and joint networks within and between European peripheries, advanced regions with scientific and technological superiority could conventionally invest in the invention of key enabling technologies (OECD 2013), for example Information and Communication Technologies (ICTs). This view is in line with findings from previous regional studies; see Koschatzky (2005), which suggests that regions with advanced technological excellence should create the appropriate framework conditions to generate, diffuse and exploit new technologies and applications, rather than focusing on existing ones. Respectively, catch-up regions should mainly invest in the co-invention of applications, ensuring that both types, *technology driving* and *technology application* regions will get equal access to the benefits associated with the exploitation and diffusion of innovative technologies (Baier, Kroll, and Zenker 2013b).

2.2.1 From the origins of smart specialisation to *ex-ante* conditionality

The theory of smart specialisation was initially associated with the economics of knowledge and technological change (Foray, 2004), but it expanded rapidly as a new regional academic concept in the economic geography literature in a very short period of time (Foray 2016). To highlight the growing value of smart specialisation in the regional innovation landscape, Philip McCann points out in his recent work:

"The novelty of the smart specialisation concept was that although it emerged from the literature on the economics of knowledge and technology, it provided a policy-prioritisation logic and a policy agenda which was rather different to most of the currently popular technology policy recommendations, although it was based on ostensibly the same underlying rationale, namely that of enhancing innovation, technology and growth" (McCann 2015, 170)

Smart specialisation received growing attention when economists looked at fostering a pan-European knowledge generation and diffusion framework, by examining the transatlantic differences between Europe and US, and by attempting to explain how different approaches to knowledge spill overs contributed to creating this productivity gap (van Ark, O'Mahony, and Timmer 2008; Ortega-Argilés 2012). Later work showed empirically that regional performance in Europe, compared to the US, was linked with inefficiencies in the existing institutional and governance setup of the EU territorial landscape (Fagerberg, Feldman, and Srholec 2014). Similarly, the logic of R&D specialisation, whose significance has been increasingly stressed in the S3 framework, is not new, as several studies have systematically attempted to examine how the variation in R&D intensity impacts on sectoral, regional and national performance (OECD 2011a). Historically, some of the smart specialisation ideas (e.g. the entrepreneurial discovery) have been widely used in innovation and economic studies for many years under different terminologies (McCann and Ortega-Argiles 2013b), but it was recently redefined by a group of academics, called the *Knowledge for*

Growth-K4G Expert Group (Foray 2014), who provided a more collective approach. The K4G Expert Group operated as an independent advisory body to the EU to advise how sustainable growth and prosperity could be better promoted within the European Research Area (ERA).

The logic of smart specialisation was initially applied at a sectoral level, and then shifted to an appealing policy approach which currently concentrates the regional policy interest in Europe (McCann and Ortega-Argilés 2015). The policy-prioritisation incised in smart specialisation rationale is based on the assumption that different countries and regions possess different knowledge and learning systems and, therefore, it is more likely to develop diverse capacities and specialise in different economic areas. Clearly, smart specialisation has successfully overcome a series of previous criticisms; e.g. considered as a policy tool for advanced regions only, for which McCann (2015) argued that, quite the opposite, it is especially useful for many non-core regions. At present, its adoption and implementation constitutes an *ex-ante* conditionality for the EU regions to get access in the 2014-20 EU Structural Fund Programmes. Specifically, under this new research and innovation *ex-ante* conditionality, all EU territories are obliged to develop their own entrepreneurial search processes to develop their policy plans through an RIS3 approach (EC 2012). In practice, the *ex-ante* conditionality marked the beginning of smart specialisation as a regional innovation strategy and consolidated its implementation in the European territory.

2.2.2 The details of the entrepreneurial discovery

Arguably, the entrepreneurial discovery is the cornerstone of the smart specialisation strategy, as it is the main means of experimenting and discovering which specific domains of the economy lead, or will lead, to entrepreneurial opportunities for knowledge-based and innovation-driven growth. It is a practical tool for either economically weak or strong territories (OECD 2012b), providing an analytical

framework for strategic identification and prioritisation in regional innovation policymaking. Capello (2014) recognises the entrepreneurial discovery as a conceptual pillar of smart specialisation. In general, it is argued that it is the entrepreneurial discovery itself which distinguishes smart specialisation from other traditional industrial and innovation strategies (OECD 2013). Methodologically, the entrepreneurial discovery differentiates itself from the traditional exercise of Science and Technology (S&T) foresight, given that it contains imagination, creativity and strategic vision (Foray 2016), elements which are currently neglected and missing from the technology foresight exercise or other similar forecasting tools. In addition, to design and apply the entrepreneurial discovery effectively, repeated and collective efforts are required (Moodysson, Trippl, and Zukauskaitė 2015), in which the mobilisation of both the public and private sectors is absolutely necessary and crucial (McCann and Ortega-Argiles 2013b). In the S3 literature, local actors are understood as *entrepreneurial actors*, encompassing a broad list of players, beyond the traditional meaning of the term entrepreneur (Foray, David, and Hall 2011). Universities, private firms, intermediary organisations, development agencies, regional authorities and other official entities with a key development role are considered as entrepreneurial actors in the S3 context.

Through S3 practices, entrepreneurial actors from diverse economic sectors are encouraged to collectively identify, assess and understand the complex nature and dynamics of their regional ecosystems, with the objective of supporting regional Science, Technology and Innovation (STI) policymaking in the context of S3. In this framework, it is vital to make sense of the entrepreneurial action that key stakeholders such as firms, universities, regional agencies etc, should be jointly undertaking during the discovery process to identify specialisations within economic domains which currently excel or will excel in the future. Interestingly, joint action and interplay among key entrepreneurial actors is not only essential for improving innovation performance - it is argued that a continuous interaction among different R&D actors strengthens

further the systems of innovation (Lundvall 2010; Edquist 1997) - but also represents potential for additional intra-regional cumulative learning (Foray 2016). Moreover, within a regional innovation ecosystem, several sub-systems including entrepreneurial networks, R&D clusters, knowledge accelerators, research-industry consortia etc, are likely to function quite differently (Landabaso and Foray 2014) and therefore the discovery process could be thought of as a useful tool for the learning region (Storper 1997; Florida 1995; Asheim 1996b) to supplement and fortify its knowledge further on how such complexity works and evolves over time. In this respect, the entrepreneurial discovery can be seen as an ongoing learning process in which different types of knowledge sets (e.g. science and technology knowledge, entrepreneurial and market knowledge) are combined to drive specialised diversification (OECD 2013).

2.2.2.1 No optimal way for implementing the entrepreneurial discovery

The theoretical underpinnings of smart specialisation suggest that there is no optimal way to run the entrepreneurial discovery in the regional setting, given that regional dynamics vary greatly across Europe; see for example Landabaso (2014); David, Forey, and Hall (2012); OECD (2013); Foray, David, and Hall (2011). An analytical explanation for S3 implementation is limited to a series of methodological studies which have been published to support smart specialisation development through the provision of abstract guidelines. Most studies indicate a common methodological element, which suggests that the entrepreneurial discovery should follow a continuous participatory process in which a massive stakeholder involvement should be ensured; see for example (EC 2014d, 2012; OECD 2012a). Neither do recent empirical findings indicate a clear and analytical pattern as to how regional self-identification and prioritisation should be carried out in the context of S3; see for guidance Capello and Kroll (2016); Gianelle et al. (2016); McCann and Ortega-Argilés (2016a); Sörvik et al. (2016). The lack of clear and detailed guidelines for the implementation of the discovery process is to some extent reasonable, given the spatial heterogeneity of

European regions in generating and boosting innovation-driven growth (e.g. heterogeneity in terms of research, innovation and entrepreneurial potential; institutional and governance capacity; regional autonomy etc). Also, it can be explained through the lens of the one-size-fits-all theory (Tödtling and Trippl 2005), which suggests that local and regional policymaking cannot be merely based on copying best practice models. While there is an indication of the three most important complements of the entrepreneurial discovery, meaning the entrepreneurial actors, the generation of entrepreneurial knowledge, and the interaction among those possessing entrepreneurial knowledge (Rodriguez-Pose and Wilkie 2015), we still lack clarity as to how these factors are related and work in practice. Research addresses such topics currently.

What empirical evidence says at present

An important question in the frame of smart specialisation is how the practical dynamics of the entrepreneurial discovery can be better understood in the regional context. And as we have already discussed previously, the answer to this question is still unknown. In fact, understanding better the practical workability of the discovery process and its step-by-step realisation in the regional setting is still an open issue in the S3 literature (McCann, van Oort, and Goddard 2016), and rests on the ability to investigate and collect a growing number of empirically based findings from diverse regional territories (Capello and Kroll 2016). In this respect, entrepreneurial discovery can be better understood if it is studied as an evidence-based approach. Besides, the importance of evidence and expertise in policymaking and action has been extensively studied in the literature (Mitra 2006; Shaxson 2005). To this end, several studies, reports and surveys have been conducted throughout Europe since the onset of S3, with a particular attention to the role that different stakeholders should take during the design, implementation and self-evaluation of the discovery process. Examples at the European level include S3 empirical investigations in Møre and Romsdal (Asheim

and Grillitsch 2015); Scania (Moodysson, Trippel, and Zukauskaitė 2015); other Scandinavian regions (Asheim, Grillitsch, and Trippel 2016); Malta (Luke et al. 2014); Basque country (Morgan 2016; Valdaliso et al. 2014; Estensoro and Larrea 2016; Marques and Morgan 2018); Andalucía (Gianelle et al. 2014); Wales (Morgan 2017); and other EU regions and countries (Kroll et al. 2014; Aranguren et al. 2018; Patricia and Tea 2017; Iacobucci 2014).

The importance of investigating what particular actions should be undertaken by different entrepreneurial actors, is a high S3 priority due to the gap in understanding how these actors are practically engaged in bottom-up activities (Marinelli and Perianez-Forte 2017). For example, a number of empirical studies emphasise the significant role of universities and research centres in the discovery process, by highlighting their potential to connect global and local knowledge domains; see the work of (Kempton et al. 2013; Rodrigues and Fonseca 2017; Fotakis et al. 2014; Marlow and Richardson 2016). Other studies acknowledge the value of ensuring a broad participation of private firms in sharing and diffusing entrepreneurial knowledge (Landabaso, McCann, and Ortega-Argilés 2014; Gianelle et al. 2016), as well as the role of intermediary agencies (e.g. financial institutes) in supporting the development of the entrepreneurial discovery (Foray, David, and Hall 2011; Kroll 2016). Marques and Morgan (2018) stress the importance of multi-scalar co-ordination in policymaking, in which key actors at different geographical levels need to collaborate to implement innovation policies and strategies.

The existing evidence on entrepreneurial discovery shows clearly that it is a multifaceted and inclusive process (Rodríguez-Pose and Wilkie 2015). It also shows that its effective realisation is by no means a straightforward process, given the inherent difficulty of conducting an in-depth discovery process in which broad priority areas can be turned into specific action plans for regional specialisation and diversification. For instance, Patricia and Tea (2017) have recently used empirical evidence from the Slovenian territory to show the complexity of recognising specific industrial

specialisations during the discovery process. Along the same line, Landabaso, Komminos, et al. (2014) have previously stressed the tendency to define regional specialisation in a broad manner, instead of specifying detailed S3 actions and activities due to the difficulties inherently connected with the entrepreneurial search processes (e.g. inadequate collaboration among local entrepreneurial actors).

Another aspect of the entrepreneurial discovery has been recently revealed by a number of empirical studies, which have further informed S3 ongoing literature. Evidence from these studies suggests that the process of discovery has evolved from a single identification activity into a continuous process suitable for showing how new institutional and governance arrangements might bring more efficiency in the S3 context, by mobilising an active participation of entrepreneurial actors; for example, see (Marinelli and Perianez-Forte 2017). In this emerging view, the entrepreneurial discovery is not only about priority choices and identification of complementarities among different policy domains (Foray and Goenaga 2013), but also about experimental self-discovery geared to yielding learning on what capacities, institutions and governance reforms might be more appropriate for the development of S3 (Rodriguez-Pose and Wilkie 2015; McCann, van Oort, and Goddard 2016; Foray 2016). Thus, within a continuously changing S3 context, the discovery process currently takes on a new learning-by-doing dimension which may help catch-up regions to identify priority actions in new venture opportunities and simultaneously indicate other important aspects for S3 implementation (e.g. what forms of capacity building are relevant, where and how to accelerate structural change etc). But what exactly is meant by catch-up regions? What are the main features of a typical catch-up region in the European territory?

2.3 A typology of catch-up regions: conceptualisation and understanding

It is important for the thesis to provide a solid understanding of the nature and structural specificity of catch-up regions. The typology employed in this study takes into

account various determinants of innovative performance of a given territory with concrete geographical boundaries. It is based on the NUTS-Nomenclature of Territorial Units for Statistics classification provided by the EU (EU 2015).

At a policy level, there have been several ways of classifying regions into different performance groups according to their innovation capacity and their different innovation journeys (Benneworth 2007). For example, the classification provided by the EU through the Regional Innovation Scoreboard and Innovation Union Scoreboard, (EC 2015, 2014e), categorises European regions into four core innovation performance groups: leaders, followers, moderate and modest. The last two categories, namely the modest and moderate innovators, perform below the EU average and typically fit well with the characteristics of the regions addressed in this study. Methodologically, the EU approach is based on the analysis of three sets of indicators which measure the innovation performance external to the firm (enablers), at the level of the firm (firm activities) and capture the effects of firms' innovation activities (outputs).

The indicators proposed by the OECD (2011a) are appropriate for identifying regions with weak innovation capabilities and structures (Tripl, Asheim, and Miorner 2015). Furthermore, the OECD regional classification scheme, also based on different innovation-related variables, categorises regions into three main groups: knowledge-hubs, industrial production zones and non-S&T driven regions, where the latter is more likely to represent the characteristics of the regions we target in this work, as it refers to primary-sector-intensive areas with high levels of structural inertia. Moreover, the non-S&T driven category includes lesser performing regions with high levels of unemployment rates, low technological capabilities, and limited abilities in manufacturing (OECD 2011b).

Regional classification in the context of smart specialisation

Reflecting on the way in which smart specialisation is being implemented throughout Europe, Kroll (2015a) distinguishes three main types of EU regions: *starters*

(Eastern European regions), *active beneficiaries* (Southern European regions) and *drivers* (Central and Northern European regions). This grouping, however, seems to be based mainly on the mismatch between smart specialisation action plans and local governance systems, without considering a number of micro-level parameters such as capabilities and competences developed at the level of firms. Through their analysis of a comparative study of eight regional cases, Aranguren et al. (2018) use a broad typology to group European regions into different groups from a multi-level governance perspective: *single-level regions* in which S3 practices are dominated by one level of government; *top-down multilevel regions*, in which S3 development is largely based on national-level decision-making; and *networked multilevel regions*, in which multiple territorial levels are used to develop S3.

2.3.1 The characteristics of less-favoured regions

While there are not any universally accepted standardised criteria for grouping regions into different innovation performance groups, our classification is based on the way in which territories (mainly at NATS2 level) are able to produce and absorb new knowledge and technology; create new or upgrade existing specialisation patterns; and undertake particular processes for institutional change and structural reform to catch-up. The interest of this study is centred particularly on low innovation performance regions, which typically tend to face weaknesses related to the smart specialisation implementation (McCann and Ortega-Argilés 2015). Such regions are usually defined under different terminologies: *learning* (Morgan 1997; Lundvall 2010; Lundvall and Johnson 1994; Asheim 1996a; OECD 2001; Florida 1995; Maskell and Malmberg 1999); *technology-followers* (Forbes and Wield 2002); *catch-up* and *backward* (Abramovitz 1986; Verspagen 1991; Fagerberg and Verspagen 1996; Cappelen, Fagerberg, and Verspagen 1999); *less-favoured* (Morgan and Nauwelaers 2004); *transition* (Cooke 2011; EU 2015).

In general, less-advanced regional territories are usually characterised by relatively low innovation performance and seem to have little social capital and governance capacities. More specifically, they are likely to have fragmented regional innovation systems (Cooke, Gomez Uranga, and Etxebarria 1997; Tödting and Trippel 2005; Martin and Trippel 2014), weak learning capabilities and skills (Malerba 1992; Oughton, Landabaso, and Morgan 2002), low potential for absorptive capacity (Cohen and Levinthal 1990; Lundquist and Trippel 2013; Asheim and Grillitsch 2015), limited abilities to diversify into new industries (Boschma, Heimeriks, and Balland 2014), low entrepreneurial potential (Fritsch 1992), and significant challenges in mobilising institutional and structural change (Neffke et al. 2014) due to the existence of strong path-dependent inefficiencies and various forms of lock-in effects (McCann and Ortega-Argiles 2013a; Boschma, Heimeriks, and Balland 2014; Isaksen 2001). Additionally, they appear to have limited power to tackle fundamental issues related to unemployment and social exclusion (Lovering 1996), and, usually, suffer from inefficiencies associated with under-institutionalisation (Landabaso, Valdaliso, et al. 2014).

2.4 Enablers of smart specialisation implementation

Empirical evidence suggests that smart specialisation practices are conducted differently across diverse EU regions, depending on their capacities, institutions and governance structures (Foray 2014; OECD 2012a; Kroll 2015b; Rodriguez-Pose and Wilkie 2015). They also depend on the ability of regions to initiate structural reforms and improve the way that innovation policymaking is institutionalised, governed and regulated (McCann 2015; Gianelle and Kleibrink 2015; Grillitsch 2015). For example, studying S3 practices in economically strong European regions, Asheim, Grillitsch, and Trippel (2016) have recently found that three Scandinavian regions (the North Denmark Region, Scania in Southern Sweden, and Møre og Romsdal in North Western Norway) were able to adopt and implement S3 for regional diversification. In contrast, poorer regions such as Malta (Luke et al. 2014) and Eastern Macedonia and Thrace (Marques

and Morgan 2018) faced important implementation barriers due to thin institutions and weak capabilities. In this regard, it would be essential to review how the existing literature captures the role of capacity-building in developing smart specialisation, as well as the way in which institutional governance frameworks shape S3 realisation in the regional setting. Both aspects are reviewed and discussed separately in the following sections.

2.4.1 Capacity building and Smart Specialisation

2.4.1.1 Economic growth and capacity building

The pivotal role of capabilities in boosting regional development has been extensively acknowledged in economic growth (Bell and Pavitt 1995). Storper (1997) emphasised that the ability of territories to improve capacity is a determinant factor of economic success, while Varblane, Ukrainski, and Lillestik (2012, 53) argued that the *"critical task for the catch-up economies is to increase the learning capacity of the whole society"*. Rodríguez-Pose and Wilkie (2017) have recently argued that regions, particularly poorer areas, must overcome capacity building constraints to design and implement sound development strategies. In this respect, the authors see capacity building as a means to implement regional development. Empirical research suggests that a successful mobilisation and exploitation of different types of capabilities is not only essential for a region, but also for diverse local actors found within the region (Iammarino et al. 2012; von Tunzelmann 2009; Bell and Pavitt 1995). Literature on capacity building is particularly vast, with plenty of arguments supporting the importance of studying capabilities at both the organisational (micro-level) and regional level (meso-level). For example, previous studies have argued that regional development is strongly conditioned by the effectiveness of building individual firm-level capabilities (Lall 1998; Howells 1999; Neffke et al. 2014), while firms' success is greatly dependent on the available resources and capabilities of a given region (Maskell and Malmberg 1999; Eisenhardt and Martin 2000; Howells and Bessant 2012). To show

the significance of setting capacities at the micro-level, Cooke and Memedovic (2003, 8) underline that *"there is a growing awareness among regional authorities that the economic growth and competitiveness of their regions depend largely on the capacity of indigenous firms to innovate"*. Likewise, Best (2001, 132) indicates the interaction between firms' and regional capabilities by arguing that *"regional technological capabilities spawn entrepreneurial firms, which upgrade regional technological capabilities, which spawn more entrepreneurial firms"*. Rodríguez-Pose and Wilkie (2017) argue that improving the capacity of local authorities can empower regions to develop sounder place-based approaches to regional development. In this respect, an analytical investigation at both levels (micro- and meso-) is increasingly important in understanding how the development of new and existing capabilities may condition the success of designing and implementing regional innovation strategies in the S3 context.

There are a large number of theoretical and empirical studies seeking to understand the way in which capacity building is related to productivity, innovation and development. For example, Kim (1997) indicated the central role that technological capabilities played in South Korea's rapid industrialisation, by showing how imitation was replaced gradually by innovation. Likewise, using empirical evidence from East Germany, Von Tunzelmann et al. (2010) showed how diverse interactive dynamic capabilities contributed to the successful regeneration of the national innovation system. Apart from these indicative studies, the role of other types of capabilities has been systematically examined to understand the evolutionary approach of regional renewal and development. The following section outlines different types of capacity building with an essential role in regional innovation studies.

2.4.1.2 Types of capacity building

Without doubt there is extensive literature on capacity building. Different kinds of capabilities have been studied thoroughly at the level of firms and organisations

(micro-level), as well as at the level of regions (meso-level). Focusing on the micro-level, Winter (2003, 991) defines organisational capability as: "*a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organisation's management a set of decision options for producing significant outputs of a particular type*". Similarly, Ireland, Covin, and Kuratko (2009, 32) mention that "*when a combination of resources enables an organisation to accomplish a task, those resources are referred to as a capability*". Innovative capabilities; networking capabilities; absorptive capacity; technological capabilities; strategy building; strategic capabilities; competitive capabilities; managerial capabilities; learning capabilities, administrative capabilities; fundraising capabilities are only some of the most generic forms of capacity building which concentrate both policy and academic interests in regional development.

Normally, such capabilities condition the innovation potential of the local players, who in their turn, tend to shape the regional paths of development (Cantwell and Janne 1999; Miguélez and Moreno 2015). For the purpose of this study, we include the following forms which are usually associated with knowledge, innovation and regional development and have been highlighted and discussed in detail during the interviews: *technological and innovation capabilities* (Kim 1980; Lall 1992; Kim 1997; Teece, Pisano, and Shuen 1997); *networking capabilities* (McGrath and O'Toole 2013; Walter, Auer, and Ritter 2006); *administrative capabilities* (Farazmand 2009; Lodge and Wegrich 2014); *entrepreneurial capabilities* (Patel and Fiet 2011; Ireland, Covin, and Kuratko 2009; Corner and Wu 2012) and *financial-investment capabilities*. In addition to the complex process of local capability formation (Kim 1997), we seek to highlight the overlapping range of the most common types of capacity building identified above. Thus, in order to provide additional clarification on the different forms of capacity building, we present Table 2.2 which outlines a short description and explains briefly how each type of capability is differentiated from the others.

Table 2.2 Forms of capacity building at the micro-level

Type of capability	Description	Relevant literature
Absorptive capacity	<i>"Organisations' ability to recognise the value of new external information, assimilate it and apply it to commercial ends"</i>	(Cohen and Levinthal 1990; Bosch, Volberda, and Boer 1999; Zahra and George 2002)
Technological and innovation capabilities	<i>"Technological capability refers to organisations' ability to make effective use of technological knowledge in efforts to assimilate, use, adapt, and change existing technologies"</i>	(Kim 1980; Lall 1992; Bell and Pavitt 1995; Kim 1997; Teece, Pisano, and Shuen 1997; Lawson and Samson 2001; Zheng, Liu, and George 2010)
Networking capabilities	<i>"Innovation capabilities refer to the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders"</i> <i>"Organisations' ability to develop and utilise inter-organisational relationships to gain access to various resources held by others"</i>	(McGrath and O'Toole 2013; Walter, Auer, and Ritter 2006; Håkansson and Snehota 1989; Anderson, Dodd, and Jack 2010; Ebers 1999; Hakansson et al. 2010; Sullivan Mort and Weerawardena 2006)
Administrative capabilities	<i>"Ability to improve administration structures and processes"</i>	(Farazmand 2009; Eglene, Dawes, and Schneider 2007; Lodge and Wegrich 2014; OECD 2006)
Entrepreneurial capabilities	<i>"An entrepreneurial capability exists when an organisation exhibits a systematic capacity to recognise and exploit opportunity"</i>	(Ireland, Covin, and Kuratko 2009; Covin and Slevin 1991; Corner and Wu 2012; Newbert, Gopalakrishnan, and Kirchhoff 2008; Patel and Fiet 2011)
Financial-investment capabilities	<i>The ability to use a mixture of skills and competences to assess and make strategic decisions on medium and long-term level investments. It also refers to the ability of organisations to look for different types of financial resources and make sense of them to fulfil their objectives</i>	(Kempson, Collard, and Moore 2005; Luo 1999; Ernst 1994)

Source: Author

2.4.2 Do micro- and meso-level capacities matter for smart specialisation?

Both early and late S3 evidence suggests that EU regions with well-developed capabilities appear to be most responsive to the smart specialisation agenda (McCann and Ortega-Argilés 2016a). In this respect, capabilities do matter for smart specialisation and, therefore, capacity building and S3 should co-evolve in a hand-in-hand approach. In former work, Foray (2014) emphasised that regions' S3 challenges are to design place-specific policies which will later allow the creation of intrinsic capabilities for achieving an interregional comparative advantage. While poor institutional and governance capacity may not necessarily imply innovation policy failure, in the smart specialisation context it is highly related to challenges surrounding the development of S3 (OECD 2013). This view can be better understood in catch-up regions which are routinely backward in capacity building (Verspagen, 1991), suffer considerably from weak learning abilities (Morgan 1997; Malerba 1992; Lall 1998; Cooke and Morgan 1998b), and tend to lack strong institutional structures (Rodríguez-Pose 2013). In this regard, the need to understand the connection between capabilities and smart specialisation has received a growing interest since the onset of S3 in the regional setting. Thus, an important part of S3 research is currently driven by the investigation of empirical evidence, aimed at explaining how, and under what specific conditions the formation of capabilities would help catch-up territories to tackle the operational challenge of S3 (Morgan 2016).

Clearly, current evidence suggests that capacity building is crucial for the development of S3, as it supports regions in building search mechanisms for entrepreneurial opportunities (Asheim and Grillitsch 2015; Foray 2016) and, simultaneously, facilitating the initiation of institutional and governance reforms (Grillitsch 2015; McCann, van Oort, and Goddard 2016). Empirical examples which show the way capacity building currently impacts the realisation of smart specialisation vary considerably, indicating how different forms of capacities contribute to S3 developmental stages. For instance, OECD (2013) investigated the importance of catch-

up regions to *"provide the right framework conditions to build capabilities that stimulate the entrepreneurial discovery process"*. It showed empirically that certain EU regions have seen remarkable progress in the entrepreneurial discovery due to collective efforts to improve the absorptive capacity of diverse local entrepreneurs (the case of South Moravian region in Czech Republic). This is one example from the micro-level perspective which shows how organisations' absorptive capacity can progressively facilitate the entrepreneurial mechanisms of the regions. Examples at the meso-level study provide evidence on how the enhancement of intra- and inter-regional networking capabilities led to better experimentation and discovery results through interactive learning; see (Foray 2016; Foray 2014). It was argued that interactive learning among different local players is crucially important as it facilitates knowledge exchange (Edquist 1997), and supports the creation of dynamic capabilities appropriate to accelerate structural change (Morgan 1997). Kyriakou et al. (2016) and Gianelle et al. (2016) indicated how improvements in local governance capabilities provided opportunities for institutional learning in the S3 context.

The rising importance of studying capacity building for smart specialisation has been also underlined by Sörvik et al. (2016) who stressed the need to understand the way regional capabilities could influence the encouragement of inter-regional collaborations. The authors supported further the empirical observation that collaborations among different stakeholders have been decisive for the implementation of S3, and explained why additional research studies are needed to analyse the effect that new skills and capacity building might have on the self-discovery process. In the same vein, Kroll (2015a) assumed that regions with weak regional structures and limited capacity are more likely to face conceptual and practical difficulties in implementing RIS3 efficiently.

The cases discussed above suggest that the success of integrating smart specialisation policymaking is partly conditioned by regions' collective ability to constantly stimulate capacity building, either by improving existing capabilities or by

creating new ones. However, although the current literature acknowledges the importance of capacity building at the sub-national level e.g. (McCann and Ortega-Argiles 2013b; Foray, David, and Hall 2011; Boschma and Gianelle 2014), it still lacks robust evidence in respect of which particular capabilities and what learning conditions should be developed exclusively for a rapid adaptability of smart specialisation in the regional context. The crucial point is not only to drive smart specialisation research towards developing regional competences to recognise the potential of renewal (Boschma and Gianelle 2014), but also towards understanding the patterns for improving regions' ability to transform this potential into practice. In fact, the process of learning is inherently complex in nature (Morgan 1997), and this rather indicates that the formation of new regional capabilities which is based on different learning dynamics might be ambiguous. Up to now, research remains normative and descriptive rather than analytical and critical, as it merely indicates the difficulty to adapt smart specialisation interventions and simply shows the need of regions to improve their learning abilities to diversify in the long-run. Within the current smart specialisation framework the process of learning is not fully captured in an explicit way, as both the new types of knowledge and the domestic capabilities that should be mobilised and combined are still unknown. Surprisingly, there is not any clear framework to study empirically how and to what extent improvements in regional capability building will ultimately affect the learning process of the regions to trigger structural change and stimulate new path creation. For example, while the available evidence can now acknowledge empirically the importance of related variety on the RIS3 effectiveness e.g. (Boschma and Frenken 2009), our understanding in respect of how regions could improve their learning mechanisms to systematically address technological connectedness within the smart specialisation context is still limited and fuzzy. In the same way, although there is a general acceptance that the mobilisation and engagement of key local entrepreneurs is vital for the discovery process, we still do not know what forms of social capital and knowledge skills could work together effectively

to generate regional consensus and trust to effectively overcome institutions' inertia. This gap seems to increase markedly in the case of the less-favoured regions where the challenges that emerged during the ongoing macro-economic crisis in Europe have increased the vulnerability of the local ecosystems to external shocks (Komninos, Musyck, and Reid 2014; McCann and Ortega-Argiles 2013b), and, in fact, have limited importantly our ability to achieve robust space-neutral policy observations.

There is a strong need, therefore, to explore which specialised learning capabilities and which effective combinations of knowledge competences are more likely to work better for the smart specialisation dynamics particularly in less-favoured regional environments. In this area, current research is limited and gaps should be tackled efficiently. In practice, new empirical research should be designed and oriented towards identifying which new types of capabilities should be created and which pre-existing capacities and structures should be upgraded to facilitate the feasibility of institutional and governance reform, with the ultimate aim to support regions to catch-up in the long-run. In this respect, several findings related to smart specialisation studies have recognised the need for intervention at institutions and at different levels of governance, e.g. (Foray 2014; OECD 2013; Asheim and Grillitsch 2015; EC 2012; Thissen et al. 2013), as several bottom-up governance issues appear to have a remarkable impact on policy outcomes (Becker, Egger, and von Ehrlich 2012; Rodríguez-Pose 2013).

2.4.3 Institutions, governance and smart specialisation

2.4.3.1 Institutions and regional growth

The importance of institutions in economic development has been increasingly acknowledged in evolutionary economics (Grillitsch 2015; Rodrik 2005). As such, institutions have been studied at different geographical levels, comprising the regional, national and supra-national levels (Hassink 2010), as well as through other analytical lenses, including the industry-specific dimension (Boschma and Frenken 2009). Many

efforts have been made to study the way place-specific institutional structures impact on regional economic performance. Most of this work seeks to understand how institutions and institutional change are possible to address policy failure and improve economic growth (Streeck 1991). But, what do we mean by institutions and how are institutional arrangements related to regional innovation strategies and economic development? Given that there is no unanimity in the definition of institutions, this thesis adopts the most commonly cited definition given by North:

Institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction. In consequence they structure incentives in human exchange, whether political, social, or economic. Institutional change shapes the way societies evolve through time and hence is the key to understanding historical change (North 1990, 3)

In general, institutions are numerous and vary considerably (Lakshmanan and Button 2009). Within the institutional economics framework, two key concepts have drawn attention over the last decades: formal institutions and informal institutions. Formal or hard institutions refer usually to rules, laws and organisation, while informal or tacit institutions include individual habits, routines, social norms and values (Amin 1999). In practice, the former take an explicit form to regulate social behaviour and the latter emerge as an outcome of daily patterns and social routines. North (2005) emphasises that though informal institutions are usually not written in a clear and official manner, they tend to be more persistent than written rules in formal institutions. Institutions, either formal or informal, are seen as essential for economic activity and growth (Rodrik 2004a) and, as such, are also an important unit of analysis for the development of S3 as a key regional innovation strategy in Europe (Grillitsch 2015).

Institutions and regional innovation strategies

There is much ongoing discussion about how regional institutions affect local growth strategies. It is argued that institutional factors play a key role in shaping regional development growth (North 1990). Watkins et al. (2015) suggest that good development policies will need to be supported and governed by capable and informed institutions. Amin and Thrift (1995) suggest that there are regions which experienced economic development because of their institutional thickness. According to the authors, institutional thickness refers to *"a combination of features including the presence of various institutions, inter-institutional interactions and a culture of represented identification with a common industrial purpose and shared norms and values which serve to constitute 'the social atmosphere' of a particular locality"* (Amin and Thrift 1995, 104). Other authors, for example Rodríguez-Pose (2013), suggest that institutional thickness (e.g. areas with a large number of institutions) does not necessarily lead to successful policy outcomes, as it is a proper mix of institutions that seems to matter more. Acknowledging either view, the underlying argument relies on the fact that good institutions favour the framework in which development strategies are implemented. Especially if these strategies are based on a place-based approach, then a series of tailor-made institutional changes might be necessary at the local level (Morgan 2013).

The impact of institutions on regional strategies and growth can be examined and discussed from many different perspectives. For example, focusing on the learning approach, Morgan (1997) argued that the learning capacity of a region is very much determined by its institutional base; e.g. lack of effective institutions to favour network linkages may lead to limited knowledge exchange and learning fragmentation. Other perspectives of analysis show that sound formal institutions improve the conditions for private investments and economic activity (Jütting 2003) and minimise uncertainty and corruption by reducing the risk of social and political instability (Rodrik 2004a). Similarly, effective informal institutions can reduce transaction costs (Rodríguez-Pose

2013) and make policy governance performance more stable (Amin 1999). Dosi and Malerba (1996) emphasise that it is the interrelation between formal and informal institutions that determines the incentives for, and constraints to, innovation policy processes. Recent empirical findings show that institutions have indeed an impacting role on regional innovation performance; see for example the work of Ederveen, Groot, and Nahuis (2006); Rodríguez-Pose and Di Cataldo (2015). Hence, an interesting question of particular interest in this study is how institutions and institutional change are practically affecting the implementation of smart specialisation strategies in catch-up territories. Are there any empirical findings at present and what do they show? For example, concerning the dynamics of institutional change, historical institutionalism distinguishes between four modes of change: displacement, layering, drift and conversion (Buseti 2015; Mahoney and Thelen 2009). According to the authors, displacement takes place when existing rules are replaced by new ones, layering refers to the introduction of new rules alongside existing ones, while drift and conversion keep formal rules the same (in this case, institutions' impact derives from changes in exogenous factors). This work, however, studies institutional change in economically strong European regions.

2.4.3.2 Institutional dynamics and smart specialisation: theoretical and empirical contributions

Given that formal and informal institutions determine the framework in which regional growth strategies evolve, one should reasonably expect that the institutional set-up of a region should also affect the development of smart specialisation (as a regional innovation strategy). Latest theoretical and empirical findings tend to support this assumption, by revealing a straight connection between the institutional environment and the realisation of S3 (McCann, van Oort, and Goddard 2016; Rodríguez-Pose and Wilkie 2015; Gianelle et al. 2016; Morgan 2013; McCann and Ortega-Argilés 2014; Foray and Goenaga 2013). For example, analysing institutions

from the perspective of diversity and integration, Grillitsch (2015) shows how improvements in these particular areas could possibly affect S3 outcomes in the regional setting. The author provides a theoretical model to show how changes in institutional diversity and integration stimulate entrepreneurial discovery and agglomeration processes. The problem with this approach, however, is that no other institutional dimensions are analytically examined (e.g. industry-specific institutions, interplay between different levels of territorial institutions etc) to determine if and how other elements and types of institutional framework may affect S3 implementation in practice.

Other similar studies examine empirically the relationship between institutions and smart specialisation development. For example, focusing particularly on the process of entrepreneurial discovery, Rodriguez-Pose and Wilkie (2015) suggest that the institutional environment of a region is a prominent determinant of whether the interaction and collaboration among diverse entrepreneurial actors will be effectively initiated and sustained. The authors argue that thin institutions are more likely to hinder the validity, effectiveness and outcomes of the discovery process and, therefore, *"a sound institutional context seemingly provides the optimal setting for the entrepreneurial discovery process"* (Rodriguez-Pose and Wilkie 2015, 20).

Analysing the UK case, McCann and Ortega-Argilés (2014) examined how domestic institutional reforms have been initiated and conducted in England to support S3 development. The authors argue that smart specialisation acted as a catalyst for changing part of the institutional set-up. In a quite similar way but from a broader perspective, Kroll (2015a) shows how diversity in European institutional patterns and settings determines policy governance options for S3 implementation. In this view, smart specialisation success is conditioned by an evidence-based thinking on what institutional framework conditions should be introduced and possibly changed to favour innovation strategies in the S3 context. A number of other related studies reveal the importance of the institutional environment in developing S3, by underlying that

smart specialisation challenges tend to increase in number and intensity if institutional and policy governance structures are weak and not flexible (Landabaso, Komninos, et al. 2014; Iacobucci 2014; Capello and Kroll 2016; Komninos, Musyck, and Reid 2014).

As to how different forms of institutions (formal or informal) tend to affect S3 capacities and progress, empirical investigation shows that both types are equally important in the context of S3. Interestingly, it is not only hard institutions that matter for the realisation of S3 (e.g. rules and laws). It is argued that soft institutions, such as policy routines and practices, also have a pivotal role in the development of smart specialisation strategies (McCann and Ortega-Argilés 2014).

2.4.3.3 Smart specialisation and governance practices

The significance of improving governance for policy implementation and economic development has been increasingly highlighted during the last years in the European policy arena (McCann 2015). In general, it is argued that environments with good and modern governance structures can benefit more from the implementation of innovation policies, compared to areas with less advanced administrative structures and conditions (OECD 2017a). In such structures, the creation of sound multi-level governance partnerships among and within different administrative levels (e.g. local, regional, national, European) is regarded as a critical success factor in the implementation of innovation-driven growth (OECD 2017b; Baland, Moene, and Robinson 2010; OECD 2017a). The governance literature suggests that good governance structures for STI policies must take into account the quadruple helix (government, industry, academia, and civil society) (Carayannis and Rakhmatullin 2014), and may lead to regional success in different ways. For example, considering the importance of diversification in regional development, Dani Rodrik mentions that *"diversification is unlikely to take place without directed government action"* (Rodrik 2004b, 8). Likewise, Tosun (2014) suggests that good governance models are likely to

support regions in absorbing European Regional Development Funds more effectively, and putting their regional plans into practice.

As to the S3 context especially, there is a widespread acceptance that the success of smart specialisation policies will partly depend on the ability of regions to rethink and redesign their governance mechanisms (Foray 2014; Grillitsch 2015; EC 2012; Asheim and Grillitsch 2015). The process of making regional governance mechanisms more autonomous and self-regulated is seen as an important element of the S3 procedure (Kroll 2016). It is argued that policy governance authority may be shifted downwards (from national to regional levels) or outwards (from government to non-governmental actors) (Flanagan, Uyarra, and Laranja 2011). Cooke et al. (2011, 530) argued that *"regional intelligence and policy learning suggest that a more proactive role is required of regional innovation governance in future"*. From a narrow smart specialisation perspective, McCann and Ortega-Argilés (2014) stressed the significance of designing a differentiated governance structure at the sub-national level, appropriate to overcome the challenges associated with the implementation of S3 in different regional territories. In essence, the role of this new governance structure will be to restart the mobilisation of the regional triple-helix mechanism (Etzkowitz and Leydesdorff 1995), and secure a dynamic and constant smart specialisation interaction among different entrepreneurs from the local government, academia and business community.

An increasing number of studies, see for example McCann (2015); Landabaso and Foray (2014), can now confirm that, at the theoretical level at least, there is reason to believe that smart specialisation could possibly be treated as a strategic tool appropriate for any type of EU region. However, as regions with different innovation potential are likely to offer different types of entrepreneurship and innovation structures (Sternberg 2011), it is essential to study how a dynamic interaction among government, academia and entrepreneurs will be effectively governed at an exclusively sub-national level to facilitate diversification and connectivity in catch-up peripheries.

The challenging point is to ensure that weaker regions will create in-house governance capabilities that will continuously allow them to develop and later on to keep the necessary regional ownership and autonomy for designing and implementing S3 locally. At present, there is an increasing risk for the weaker regions to abandon the opportunity to design and implement S3 at the sub-national level due to their inability to govern the complexity of smart specialisation practices mainly at the three different layers as identified by Boekholt et al. (2002): political, administrative and operational. Centrally-designed policies for regional intervention, however, would be entirely opposed to the principles advocated by the smart specialisation logic, and such top-down practices will gradually lead to policy failures as happened broadly in the past. As discussed earlier, less-favoured areas suffer regularly through weak governance structures when compared to more advanced ones, and this may strangle their ability to design RIS3 locally. In fact, several policy documents, e.g. Kroll (2015b), Landabaso, Gianelle, et al. (2014) and Charles, Gross, and Bachtler (2012) have recently stressed the difficulties of EU followers to implement effective RIS3 due to the lack of capacity building and previous policy learning in government. The above discussion suggests that the acceptance of smart specialisation as an innovation strategy for diverse EU regions remains at a rather theoretical level in the sense that we still lack empirical evidence about how context-specific factors will influence the learning ability of the less-advanced regions to build multi-level governance capabilities which will potentially preserve all RIS3 phases aligned at the sub-national level.

In this respect, OECD (2013) argues that the process of setting effective governance models requires the creation of diverse capacities, and, therefore, identifies three forms of capacity building which are necessary for capturing and governing smart specialisation practices: the ability of regions to recognise local strengths, the ability to design policy actions, and the ability to engage a critical mass for conducting an effective implementation. From a practical point of view, the creation, combination and mobilisation of these different types of capacity building

would be unrealistic in the medium term for many of the less-favoured regions. It was assumed earlier in this chapter that it may not be realistically possible for all regions to possess learning abilities to locally design and implement place-based policy making, meaning that some level of centrally-designed intervention is possibly inevitable. An empirical example with practical implications in the smart specialisation process is the fact that small regions with fragmented innovation systems and weak entrepreneurial structures are unlikely to achieve the critical mass required for conducting the identification process effectively (Landabaso, Georghiou, et al. 2014). Thus, the crucial point is to drive research into two distinct and important directions, relevant for different smart specialisation phases. The first one, rooted by the inherent difficulty of the catch-up regions to promote place-based interventions, is to investigate what regionally-based capabilities are required to strike a balanced equilibrium between centralised and decentralised governance action. A self-reinforcing learning of how to systematically reconcile these two seemingly conflicting bottom-up and top-down approaches will release additional policy learning and facilitate place-based policy action in the short and medium term. The second direction considers smart specialisation practices from a more permanent and long-standing perspective. Its aim will be to study how the setting of inter- and intra-regional learning mechanisms will increase the ability of regions to improve their bottom-up governance structures and become *smart specialisation efficient* in the long run. In practice, as cumulative learning may support the unlocking of regions from inefficient path-dependent routines (Martin and Sunley 2006), smart specialisation success is predicated on the presence of research that will enable an analytical understanding of how follower regions can shape their institutional setup by improving their regional governance capacities. The analysis of this dynamic process will gradually help peripheries that are tightly bound to centrally-designed routines to learn how to adapt their sub-systems to meet the place-based particularities of smart specialisation.

2.5 Conclusion

In this chapter we reviewed the theoretical context of smart specialisation as it has evolved and been deployed during recent years, and discussed its practical dynamics as an innovation strategic tool in the regional setting. A number of interesting aspects arise from the review. Furthermore, at a theoretical level, the conceptualisation of smart specialisation has been progressively informed during recent years, providing an analytical understanding of its theoretical underpinnings. We saw that since the academic foundations of smart specialisation have been extensively studied and enriched in the regional context, research interest shifts from theoretical to practical issues (Capello and Kroll 2016). Thus, an important part of the ongoing smart specialisation research seeks to understand empirically how S3 could be implemented in diverse EU regional environments.

At a practical level, reviews of recent research indicate two key factors that are seen as critical to enable and favour S3 development. The first refers to the importance of capacity building in strengthening regions' ability to tackle the implementation challenge of S3 (Radosevic et al. 2017). The S3 challenge is multifaceted and relies on a great heterogeneity of EU regions to respond efficiently to place-based innovation strategies and policies. We review empirical evidence from diverse European milieus which suggest that the development of different forms of capabilities constitutes and impacts an inherent collective capacity of the regions to implement S3. However, the process of capacity-building is only one key aspect of the smart specialisation dynamics. Governance and institutional issues are also increasingly relevant for S3. Particularly, other research shows that by setting up good institutions and governance models, regions have more chance of developing a more integrated S3 framework for regional renewal and development. Given that catch-up regions usually suffer from poor governance models and non-responsive institutional structures, the process of rethinking and redesigning regional mechanisms and practices ranks as a high priority in the S3 literature. In this regard, scholars who focus their research interests on

studying S3 development are currently asked to address a number of questions related to institutional and governance matters. For example, what particular institutions and governance arrangements matter for the implementation of smart specialisation strategies in EU regional environments? How do such permanent structures and policy practices affect the realisation of S3 in practice? Does any single institutional and governance aspect affect smart specialisation adaptability in the regional setting? What institutional reforms and changes in governance patterns are required to favour S3 policymaking and action? To what extent should these changes be made to bring about the required results? The literature review suggests that many of these questions are still open, lacking an empirical framework.

Similar sets of questions arise if attention is primarily given to the capacity building aspect. We clearly know that improving capabilities is a dynamic process which assists S3 development in different ways. However, what types of capacity building are most appropriate to affect the implementation of innovation strategies in a S3 context? Does a combination of different capacity building forms impact S3 development better? What pre-existing capabilities must be improved and what new capacities are needed to maximise the effects of smart specialisation policies? What is the extent to which these capacity building adjustments must be made?

All these research questions address ongoing challenges and gaps directly related to the implementation of smart specialisation as an emerging innovation policy tool for rebuilding the EU cohesion policy. These questions constitute a major part of the research mainstream of smart specialisation. As such, it is of great importance to address them systematically, if a well-informed and integrated approach to S3 implementation is sought. Acknowledging the value of bridging this research gap to favour S3 implementation in the regional setting, we build an empirical framework in which some of the above questions may find some analytical answers. The main objective of this framework is to investigate what institutional and governance reforms are required to support S3 development in particular EU regional environments, and to

understand how improvements in capacity building forms can facilitate the onset and development of these reforms. To set the research objectives and design the empirical investigation, an analytical conceptual framework will be built, presented and analysed in the following chapter.

Chapter 3: Building the conceptual framework

3.1 Introduction

This chapter seeks to put together many of the theoretical ideas and views discussed in chapter 2, with the objective of building a conceptual framework in which the research objectives could be effectively met. Based on a synthesis of different sources of theory, the sections of this chapter construct and develop an analytical framework in order to address a specific empirical gap, by assisting in refining research goals and formulating realistic research questions (for guidance see chapter 4, Methodology and research design). This gap relates to a central S3 research problem (why lagging regions cannot develop S3 effectively) and relies on the lack of adequate experiential knowledge to explain the context in which three key related aspects of smart specialisation theory (*institutions, governance and capacity building*) can shape S3 implementation in catch-up regions.

Moreover, in the previous chapter we reviewed the theoretical and practical underpinnings of smart specialisation as an emerging place-based innovation strategy for regional renewal and economic growth. This review revealed the important role of institutions, governance and capacity building as a key means of implementing drivers in the strategic framework of S3. There is a paradox, however, lying between these smart specialisation enablers and their influence on the way S3 practices are actually favoured in lagging regions. While we know that institutions and governance do matter for smart specialisation (Radosevic et al. 2017), we lack clarity as to which specific forms of institutions and governance arrangements must be changed in lagging regions, and how to support S3 development. We also lack understanding of the right timing for change which must happen for bringing the required results (Morgan 2016). In his recent work, Morgan (2017, 578) argues that *"although there is growing agreement*

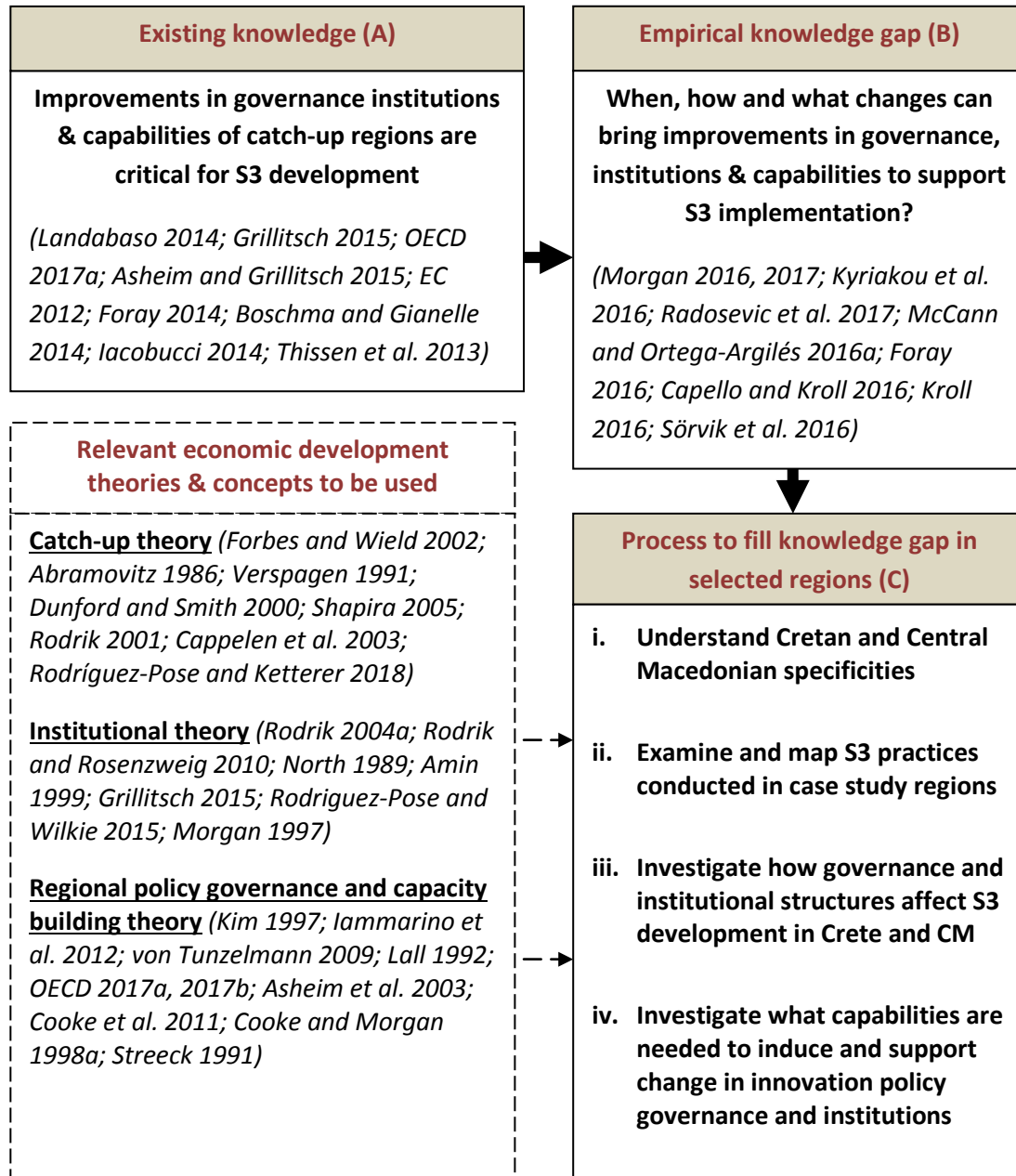
that institutions matter, there is less agreement about exactly how they matter, when they matter and whether they are a cause or a consequence of development". This implies that we may be confident that thick institutions and well-established capacities are synonymous with smart specialisation development (McCann and Ortega-Argilés 2016a), but it is difficult to determine the way in which specific forms of capabilities (e.g. innovation capabilities, absorptive capacity, productive capabilities, networking capacities etc) or institutional reforms (either formal or informal) can appropriately support S3 implementation in a specific regional environment. This challenge is due to the fact that regions with different institutional and governance structures require different types of intervention and change to become responsive to innovation policy implementation. This chapter develops a framework to address this theory-policy gap in Crete and CM with the objective of building a coherent and responsive approach to address the implementation challenge of S3 in catch-up regions. Practically, it seeks to build a conceptual framework to investigate and understand how catch-up regions can overcome institutional, governance and capacity building barriers to implement S3 effectively.

3.2 Concept mapping

Given that conceptual frameworks in qualitative studies are better done diagrammatically than textually (Miles and Huberman 1994), we use a concept-mapping approach (Novak and Gowin 1984) to illustrate the conceptual model graphically. Figure 3.1 illustrates a theory-driven model, which seeks to favour a threefold objective. Firstly, to examine what the existing literature says about the importance of governance, institutions and capabilities in developing S3; secondly, to indicate the empirical knowledge gap on these three critical elements which hinders smart specialisation implementation in lagging regions and keeps S3 debate open; and thirdly, to explain how to contribute to this debate by addressing empirically the implementation challenge of S3 in the case study regions. It also summarises a number

of relevant economic development theories and concepts that are used and elaborated to build the conceptual model.

Figure 3.1 Sequence of conceptual framework³



Source: Author

³ References illustrated in this figure are indicative.

3.2.1 Background and existing knowledge (A)

The literature suggests that the particularities of the institutional and governance structure of a given territory are likely to affect the design, implementation and outcome of innovation policymaking and, possibly, the economic development of a territory (Cooke and Morgan 1998a; Rodríguez-Pose 2013; North 1990; Streeck 1991). For example, catch-up regions or nations which have established inadequate institutional structures and poor models to govern public policy have fewer chances to expand economically than those which possess high-quality institutions and government norms (Woolcock 1998; Rodríguez-Pose and Wilkie 2017). Not surprisingly, the centrality of institutions and the importance of setting effective governance models for policy implementation have also been discussed in the S3 literature (Foray 2016; OECD 2013; McCann and Ortega-Argilés 2014; Asheim, Grillitsch, and Trippl 2016), which currently seeks to determine the way in which institutional thickness and multi-level governance affect the implementation of S3 in lagging regions (Capello and Kroll 2016).

Moreover, in the S3 context, the ability of regions to introduce modern institutional arrangements and initiate governance reforms has been directly linked to the successful realisation of smart specialisation (Grillitsch 2015; McCann, van Oort, and Goddard 2016). Radosevic et al. (2017) have recently argued that an effective development of smart specialisation requires an analytical investigation of the institutional context and capacities which are seen as a means of delivering greater efficiency in the S3 progress (McCann and Ortega-Argilés 2015). In this respect, it is increasingly important to understand how a new institutional and governance formation paves the way for a more effective and productive realisation of S3 (Kyriakou et al. 2016), and clarify when public intervention and change can be best initiated to ensure an effective implementation (Morgan 2017).

Following the discussion above, a conceptual framework which acknowledges the fundamental role of institutions, governance and capabilities in developing smart

specialisation is built. Inspired by the literature, it adopts the perception that the success of S3 implementation in backward regional environments is conditioned by, at least, three critical factors which are closely related to each other.

The first refers to the way in which institutional and policy governance frameworks of a region are structured and work in practice. It proposes that the more advanced they are, the better policy results they are expected to bring. This point is very important for smart specialisation development in the sense that catch-up regions face significant problems in implementing S3 due to their weaknesses in developing and retaining strong and responsive institutional mechanisms for policy implementation (Landabaso 2014; Grillo and Landabaso 2011). The second relates to the collective capacity of a region, both at the level of firms (micro-level) and of regions (meso-level) to develop place-based innovation strategies to react to institutions and policy governance. The model suggests that regions with strong inherent capabilities may have more chance of succeeding in building responsive innovation strategies for regional development. The third refers to the right timing for inducing and promoting change to improve regions' institutions and capabilities to develop S3 (Marques and Morgan 2018). To highlight the importance of timing, Kevin Morgan has argued recently that *"the great ironies of the RIS3 programme is that it expects the public sector to be more agile, creative and experimental when the 'age of austerity' is eviscerating public sector budgets and undermining the competence and confidence of public bodies"* (Morgan 2017, 578). Similarly, by studying the actions required for place-based development strategies, it was recently pointed out that *"the timing of each action is also crucial. Invest too early, for too long, or too much on one of these development axes and the risk of ending up with a strategy that yields scarce returns is high"* (Rodríguez-Pose and Ketterer 2018, 38).

However, we saw in the literature that it is not only the interaction among existing institutions, governance arrangements and capabilities that affects S3 realisation in the long-run, but also the ability of each to adapt to change (McCann and

Ortega-Argilés 2016a). Hence, the degree in which institutions, governance patterns and capabilities can be changed and improved to favour public policy, is also seen as a critical enabler of S3 in this conceptual model. In this respect, it is essential not only to study how governance and institutions affect S3 implementation, but also how change in governance, institutions and capacity building impacts on S3 development. Besides, regional development theory and particularly smart specialisation, advocate that innovation strategies should be designed and evolve along with the ability to bring about institutional change (Foray 2014; Boschma and Capone 2015). Furthermore, we know that the implementation of S3 actions requires strong institutions and governance models appropriate to support S3 practices (e.g. facilitate the complexity of the entrepreneurial discovery); and, if these structures are not effective they have to change. Change, however, does not happen automatically and, most importantly, its nature and ultimate impact may be very different across diverse regional ecosystems, due to high regional diversity. For example, a series of joint modifications or reforms in the governance of innovation policy strategies may have a very different smart specialisation upshot from region A to region B, given their different capabilities for responding to change (Heidenreich 2005). This view fits the *one-size-fits-all* concept (Tödtling and Trippel 2005) and underlines the importance of investigating change in diverse regional contexts.

The above discussion can lead to an assumption comprised of two sequential parts which form the underlying principle of the conceptual framework. The first assumes that in order to effectively incorporate the smart specialisation logic into their innovation strategies, catch-up regions must start rethinking and rebuilding their institutions and governance models. This assumption is advocated by a number of empirical studies which relate S3 development to the creation of sound institutions (Rodriguez-Pose and Wilkie 2015) and strong policy governance models (Kyriakou et al. 2016). The second assumes that in order to build responsive institutional and governance structures, regions should bring about change in their capacities at both

the micro-level (firm-specific capacities) and meso-level (regional capabilities) (Foray 2016). Both aspects are incorporated into this study and examined analytically to understand what institutions must be reformed and when, what governance models must be changed and how, and what types of existing or new capabilities are needed to induce change and to support innovation policy action in the S3 context. The lack of adequate empirical studies to answer this question from a theoretical and policy implementation perspective leads to a key research gap in the growing literature of smart specialisation as discussed below.

3.2.2 Empirical knowledge gap (B)

Following the discussion above, one could argue that S3 implementation is conditioned by the quality of governance and institutional arrangements embedded in regions' structures, as well as the ability of these regions to bring about change and build effective implementation policy capabilities. Put simply, the more advanced these structures are, the more likely they are to support the implementation of S3. There are a large number of smart specialisation-related studies which evidence this view at present, showing notable progress in our understanding of the role of institutions and capacity building in S3 development. However, there is a critical question, still unanswered, which constitutes a key research gap in the empirical literature of smart specialisation implementation (see Figure 3.1, B):

What changes can bring improvements in governance, institutions and capabilities to support S3 implementation in catch-up regions, how and when?

This question consists of three sub-questions which form the basis to formulate specific research questions (see chapter 4, section 4.2) to lead the investigation of this research study. It combines the work of several studies which show empirically that the process of transforming S3 logic into regional policy is easier said than done (Morgan 2016,

2017; Kyriakou et al. 2016; Radosevic et al. 2017; McCann and Ortega-Argilés 2016a; Foray 2016; Capello and Kroll 2016; Kroll 2016; Sörvik et al. 2016). In fact, this question seeks to explain empirically how change in governance, institutions and capacities impacts on regional development. Its investigation goes beyond the boundaries of S3 implementation studies, and relies on the fact that we still lack empirical understanding of what governance and institutional change is required in lagging regions for regional renewal and development (Kroll 2016; Radosevic et al. 2017), how such change impacts on economic growth (Rodríguez-Pose and Ketterer 2018), when this change must be initiated to be feasible and realistic (Morgan 2017) and what capabilities are needed to induce and support this change (McCann and Ortega-Argiles 2013a).

All these questions are the subject of regional development studies, yet they have received growing attention recently due to the S3 implementation problems in lagging European regions. As such, this theory-policy challenge is directly transferred to the smart specialisation context, questioning S3 implementation in catch-up regions. In particular, the lack of a well-grounded theoretical explanation for these critical aspects, limits our ability to inform further innovation policymaking and action in the S3 context. For example, we know from the literature that institutions affect the validity and outcome of the discovery process (Rodríguez-Pose and Wilkie 2017), that policy governance options which promote the strengthening of regional autonomy are critical to policy development (Kyriakou et al. 2016; Flanagan, Uyarra, and Laranja 2011) and that different forms of capacity building can shape the ability of regions to implement their S3 action plans (Foray 2016). However we still lack empirical understanding of how to best connect and interrelate these three key elements to regional development in a specific regional context in order to favour S3 implementation. While we know that institutional change and new capability formation are needed to favour the implementation of S3 in lagging regions (Capello and Kroll 2016), we still lack the details of building and following a systemic process to interconnect these different but closely related aspects to make them work for the purpose of implementing S3. For

example, we saw in the literature review chapter that the strengthening of regional autonomy is critical to policy governance and implementation, but it is by no means clear how much autonomy can or must be given at the regional level, given that catch-up regions usually lack the required capacities for self-governance (Morgan 1997; Iammarino, Rodriguez-Pose, and Storper 2017) and that policy governance is dependent on the overall political logic and processes embedded in a national regime (Braun 2008). In this specific example, we see that the provision of regional autonomy in catch-up regions cannot be taken for granted and, therefore, an empirical investigation is required to improve further our understanding.

3.2.3 Building the framework to address the gap

To address this gap and provide an empirical understanding of how to best tackle the implementation challenge of S3 in catch-up regions, an analytical model is built to study the impact of policy governance, institutions and capacity building on smart specialisation development. Through this model we seek to examine the way each of these regional development forces impacts on public policy development and particularly on S3 realisation, and to understand how an interaction with each other can bring about change to favour regional development in the case study regions. To meet this objective, four core stages are proposed (see Figure 3.1, C).

i. Understand Cretan and Central Macedonian specificities

This first stage suggests that in order to analyse the framework in which smart specialisation practices take place within a certain regional environment, we first need to investigate and understand the characteristics and specificities of this environment. Its rationale is based on previous research which shows that due to high levels of regional diversity, it is necessary to understand regional features before considering what regional innovation policies are most appropriate to trigger regional development (Iammarino, Rodriguez-Pose, and Storper 2017; Putnam, Leonardi, and Nanetti 1994).

To highlight the importance of regional diversity in S3 practices, Aranguren et al. (2018) use a comparative analysis of eight regional cases to show that the entrepreneurial discovery can be affected by different elements which are specific to each region. This stresses the importance of considering regional particularities such as local innovation conditions, entrepreneurial sectors and business specialisations, networks and clusters, knowledge systems and structures, R&D activities etc when examining S3 practices in the case study regions.

ii. Examine and map S3 practices conducted in the case study regions

Then, an outlining of what particular actions have been conducted by the selected regions to develop smart specialisation strategies follows. To meet this objective consistently, an analytical empirical investigation is required, which must be lead by the formulation of a clearly-defined research question. During this process, the emergence of several different elements is not only expected to provide an understanding of the way S3 was developed in Crete and CM, but also to provide the basis for building a set of additional research objectives appropriate to address the ongoing research gap (e.g. why particular routes to S3 development were selected, what were the alternatives, what tools have been created and used to support policy implementation etc). An in-depth analysis and understanding of the S3 practices conducted in the case study regions requires reflection on a combination of existing regional innovation theories and concepts, which go beyond S3 theory, and relate to the one-size-fits-all approach (Tödtling and Trippl 2005), the impact of regional disparities on implementing innovation policies (Camagni and Capello 2015; Grillo and Landabaso 2011), spatial heterogeneity on regional development and renewal (Neffke, Henning, and Boschma 2011), and governance and institutional aspects on policy implementation (Rodríguez-Pose 2013; Gianelle et al. 2016) etc.

iii. Investigate governance and institutional structures affect S3 development in Crete and CM

Given that governance and institutions play a leading role in the development of smart specialisation processes (Aranguren et al. 2018), the third stage is to investigate institutional and policy governance dynamics from two different perspectives. The first is to study the existing governance and institutional structures of Crete and CM and examine how they have impacted on S3 progress and development. Acknowledging previous empirical studies which evidence the importance of building and promoting strong regional structures for innovation-driven growth (Cooke et al. 2011), this stage aims to understand the way existing governance and institutional structures have shaped S3 implementation. In addition, inspired by earlier and recent research studies which highlight the significance of a number of place-specific factors in creating a favourable environment for policy implementation, (Milio 2008; Marques and Morgan 2018; Aranguren et al. 2018), our intention is to investigate how external shocks, (e.g. EU directives), or other dynamics embedded in the wider institutional environment of the case study regions (e.g. political support, will and legitimacy to support public-sector reforms) have favoured or hindered S3 development in Crete and CM. The second is to examine what additional changes are still required to make an institutionally-friendly environment to support S3 implementation. Both perspectives require an empirical investigation in which the collection of primary data from the case study environments is essential for the study.

iv. Investigate what capabilities are needed to induce and support change in innovation policy governance and institutions

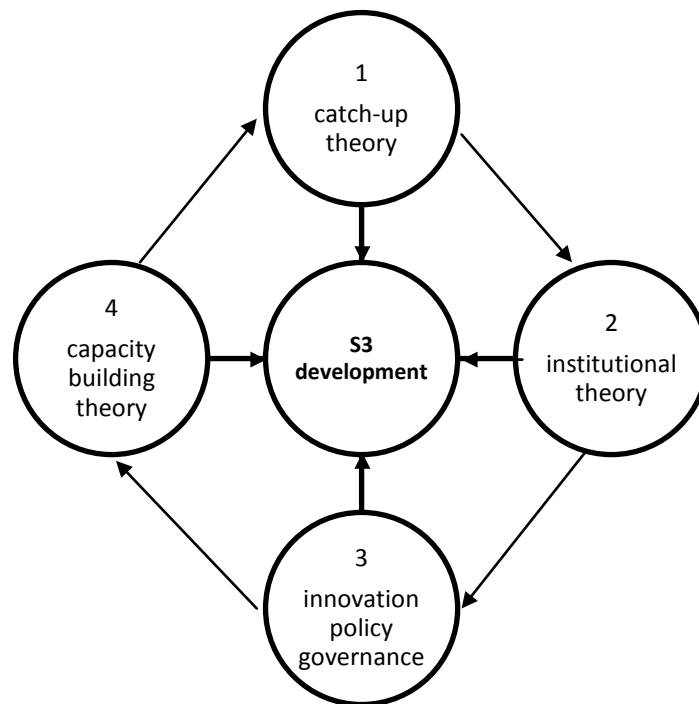
The last stage is related to the importance of capacity building and aims to study how and what improvements in capacity building can favour institutional and governance changes for the implementation of innovation strategies in the S3 context. Given that change may be subject to the ability of regions to develop strong

transformative capacities (Foray 2014) and that these capacities are increasingly important for creating responsive S3 (Valdaliso et al. 2014), this final stage seeks to understand the role of building firm-level (micro) and regional-level (meso) capabilities towards making a favourable environment for the implementation of smart specialisation. Capacity building is investigated at firms' and regions' level, given that both are required to succeed in regional development (Morgan 1997; lammarino et al. 2012; Malmberg and Maskell 1997).

Combining theories and concepts relevant to the study

Our investigation is informed and guided by the consideration of four key theories which are related to each other and have a direct impact on regional innovation studies and, therefore, to smart specialisation strategies: catch-up theory, institutional theory, innovation policy governance and capacity building theory, (see Figure 3.2).

Figure 3.2 Bringing relevant theories and concepts together



Source: Author

As to the first, we are interested in studying views, ideas and concepts related to catch-up theory for two main reasons. Firstly, as discussed in previous chapters, a number of theoretical and empirical studies suggest that S3 practical challenges tend to be most profound in weaker regions which tend to have thin institutional structures and underdeveloped governance regimes. In this respect, studying the implementation challenge of S3 in catch-up regions (instead of examining more-advanced territories) may be seen as a first priority in the ongoing literature of S3. Thus, theoretical ideas emerging from the catch-up theory are increasingly relevant to understand the framework in which EU backward regions can benefit from S3 development to catch up with top European leaders. In general, catch-up theory advocates that regions with relatively low levels of scientific and technological literacy could attain high productivity rates and grow more rapidly than the leaders if they effectively exploit new knowledge and technological opportunities (Fagerberg, Feldman, and Srholec 2014; Verspagen 1991). The problem, however, with the application of catch-up theory to smart specialisation practice is that less-advanced European regions are found to be too weak to effectively implement S3 and converge with the EU leaders. Hence, it is essential to link catch-up theory with the implementation barriers of S3 and examine whether its principles can further inform S3 implementation through our empirical investigation.

The second is that the selected regions (Crete and Central Macedonia) are two less-favoured EU regions which display many of the characteristics of catch-uppers as discussed in the literature review chapter, e.g. fragmented regional innovation systems (Cooke, Gomez Uranga, and Etxebarria 1997; Tödting and Trippel 2005; Martin and Trippel 2014), weak learning capabilities and skills (Malerba 1992; Oughton, Landabaso, and Morgan 2002), low entrepreneurial potential (Fritsch 1992), limited abilities to diversify into new industries (Boschma, Heimeriks, and Balland 2014), and significant challenges in mobilising institutional and structural change (Neffke et al. 2014). (See section 2.3.1 for further information).

Apart from catch-up theory, a combination of governance and institutional theories are also relevant to this study, given that governance of public policies is strongly dependent on the institutional thickness of a region (Davoudi et al. 2008). On the one hand, in the S3 context particularly, they are relevant in the sense that institutions are currently seen as a precondition of smart specialisation (Radosevic et al. 2017), which provides both challenges and opportunities for S3 development (Aranguren et al. 2018), while institutional change is seen as a key driver of S3 implementation (Grillitsch 2015; Kroll 2016; McCann, van Oort, and Goddard 2016), yet we still lack empirical understanding of how exactly they favour or hinder regional policy implementation in lagging regions (Rodríguez-Pose and Ketterer 2018). For example, the literature suggests that the required endogenous institutional change for S3 development may take several forms including displacement, layering, drift and conversion (Buseti 2015; Mahoney and Thelen 2009), (see section 2.4.3.1) but, at present, there is no adequate empirical evidence to clarify the mechanism in which this change takes place in catch-up regions. On the other hand, as advocated recently by Aranguren et al. (2018, 4) *"the design and emergence of new innovation policy governance does not occur in a vacuum or begin from scratch, but from a given context of previous institutions, policies and actors"*. In this respect, the authors suggest that S3 practices *"may be shaped by or be in conflict with the legacy of pre-existing strategies and policy mixes"* (Aranguren et al. 2018, 4), which raises the importance of investigating the aspects of path dependency in the governance of public policy.

From the capacity building perspective, the S3 literature evidences that a number of barriers to S3 implementation rest on a lack of capabilities in both the private and public sectors of lagging regions (Aranguren et al. 2018), showing that *"successful policies depend on the capacities of actors as much as on institutions"* (Bachtler et al. 2017, 117). In this regard, it is also critical to examine capacity building in the conceptual framework of the thesis. Besides, different types of capabilities, both at the level of firms and regions, are considered to be important ingredients for smart

specialisation policy (Gianelle et al. 2016), and as such, they are expected to have a major impact on S3 development (Thissen et al. 2013). Capacities which focus on Technology and Innovation (T&I), networking, entrepreneurship, administration and public policy governance are traditionally seen as increasingly relevant for innovation strategies and regional renewal (von Tunzelmann 2009; Boschma and Gianelle 2014; Farazmand 2009; Aghion, David, and Foray 2009) and, therefore, their impact on S3 development is examined analytically in this thesis. In economically strong regions these capabilities are built and become available for exploitation for a number of local actors even if they have not contributed to their provision (Berger 2013). In lagging regions, however, there is a problem of developing and exploiting capabilities, and local actors are less likely to benefit from capacities developed elsewhere (Kyriakou et al. 2016).

3.3 Conclusion

In this chapter we built and discussed the conceptual framework of the study. Using insights from various empirical studies on S3, we highlighted an emerging research gap which currently surrounds the implementation of smart specialisation strategies in catch-up regions. We linked this gap to the inability of catch-up regions to build strong and responsive public policy implementation mechanisms, and we explained why filling this gap is crucial for the ongoing S3 literature. In addition, we clarified how the examination of four particular theories from the regional innovation studies (catch-up theory, institutional theory, innovation policy governance and capacity building theory) is related to the one-size-fits-all view (Oughton, Landabaso, and Morgan 2002) and to our investigation particularly. This framework stresses certain research needs and it is expected to help with framing relevant research questions and determining specific methods for their operationalisation.

Chapter 4: Methodology and research design

4.1 Introduction

This chapter discusses the methodological approach employed in this thesis to meet its research objectives. It provides a thorough explanation of how the conceptual framework developed in the previous chapter is operationalised in particular regional contexts. There is plenty of literature suggesting that the development of a feasible social research design is probably the most important step to be taken in a research study; see for example (Blaikie 2009; Bryman 2004; Patton 2002; Yin 2003b). Yin (2003b, 18) asserts that *"a research design is the logic that links the data to be collected, and the conclusions to be drawn to the initial questions of a study"*. Thus, an extensive number of social research design studies have been examined, aiming at identifying and selecting the most appropriate methods for building a reasonable and well-grounded research framework. As discussed in previous chapters, this is a qualitative study, which seeks to investigate, understand and explain the context in which S3 policy dynamics are developed and evolved in certain catch-up regional environments. For this purpose, the methods of this thesis endorse a research approach in which a relatively small but rather in-depth unit of analysis is identified and studied. In this respect, the thesis does not use numerical and statistical methods to achieve an in-depth insight of S3 implementation in the regional setting; rather, it builds and examines specific case studies of S3 implementation, and puts the emphasis on their relevance and uniqueness.

Before explaining the details of the ultimate research design, we should start the discussion by confessing that the content of chapter 4 was by no means static. Contrariwise, both research design methods and practices followed an evolutionary approach to addressing existing gaps in the literature and building the epistemological

foundation. During this evolving process, research aims, research questions (RQs) and the finalised means of collecting the empirical evidence were evolved and changed notably. They were modified and aligned according to the relevance and availability of the collected data. For example, while three different types of data collection methods were initially employed to answer seven RQs (interviews, observation and questioners), eventually, two main sources of data collection (interviews and participant observation) were chosen to answer three central RQs. The reason for modifying research strategies, aims and objectives and supporting specific decision-making options on research design methods is discussed systematically in different sections of this chapter.

As a qualitative study, the thesis builds its core research framework on the elaboration of a case study approach, in which Crete and CM have been purposively selected as a unit of analysis. Both regions represent catch-up characteristics and are currently developing an S3 route to converge with more advanced EU regions. We formulated two types of RQs (what and how), whose answers were based on a sequential logic of descriptive and exploratory research. To answer each RQ separately, a combination of research strategies was used, including both an inductive and abductive reasoning. Qualitative data collection methods and especially personal interviewing and participant observation, are seen as particularly suited to this thesis. Specifically, primary data were collected by means of semi-structured interviews and participant observation, while secondary data were gathered from a detailed documentary analysis constituted by a series of official textual sources. Moreover, the collection and analysis of primary data were divided into two different phases. In the first phase, 40 semi-structured interviews were conducted for both regional ecosystems. Interviewing addressed three main types of regional actors with a direct engagement in regional innovation strategies: public authorities and agencies; firms and private-sector bodies; and local academics. To give further accuracy to the study, the second phase included a longitudinal study in which an additional set of 10 in-

depth interviews was organised and conducted in the region of Crete. Longitudinal research was necessary to identify and examine key ongoing trends, practices and dynamics of S3, during the investigation and development of the thesis.

Chapter 4 is structured as follows: it commences with an analytical discussion of the RQs employed to meet the research aims of this thesis. The discussion is focused on the justification of selecting three central questions, as well as on the objectives that each of them meets. A detailed account of the selected research strategies follows in order to explain the main methods used to answer RQs. An extended section is developed to provide a thorough overview of the methods and tools used to collect and analyse both primary and secondary data. Finally, ethical considerations and methodological limitations are discussed.

4.2 Research questions and objectives

To address its research objectives analytically, this thesis incorporates the logic of formulating RQs. There are several empirical and theoretical studies which highlight the importance of RQs in designing and developing both qualitative and quantitative research; see for example (Mason 2002; Yin 2003b; Creswell 2007; Bryman 2004; Hedrick, Bickman, and Rog 1993). Mason (2002) defines RQs as *vehicles* which help researchers moving from broad research interests to specific research objectives. Other social research studies suggest that RQs can take several forms, depending on their nature and scope. In this study, we use the work of Blaikie (2009) who distinguishes RQs into three main kinds according to the research purposes they serve: *what* questions, which follow a descriptive approach to study patterns in social phenomena; *why* questions which are intended to identify the cause and reasons of a particular phenomenon; and *how* questions which are directed toward understanding change.

In the beginning, seven RQs were created, aiming to address exploratory, explanatory and descriptive objectives (see Appendices for a full list of the seven RQs). During fieldwork, however, the RQs evolved and were modified. We refined RQs

according to the availability and validity of the collected data, and came up with a set of three central RQs, presented and discussed below. We use a combination of *what* and *how* questions to provide the basis for building the empirical investigation of this study. Each RQ forms an empirical chapter and contains subsidiary questions, aiming to meet specific research objectives. We examined a set of five key factors to formulate and finalise the questions in order to meet the objectives of this thesis:

- i. Formulating what- and how- types of RQs, which can provide a clue about what research strategies should be pursued.
- ii. Developing RQs in accordance with the ongoing literature and the gaps to be covered. A detail examination of the existing literature assisted the identification of up-to-date and focused research questions.
- iii. Keeping RQs reachable and answerable, in the sense that analytical answers can occur within a reasonable time schedule.
- iv. Formulating specific, simple and clear RQs and sub-questions, which facilitate a thorough investigation for meeting the requirements of this study.
- v. Ensuring interrelation and logic sequence among RQs, to link empirical chapters and provide credibility to the study.

Research questions

RQ1: In what ways did the selected Greek regions develop smart specialisation strategies?

The aim of this question is to discover and systematically describe the procedures followed by Crete and CM to develop S3. In fact, little is known about the rationale behind any methodological approach followed by the Greek regions to develop their smart specialisation action plans. It is of crucial importance, therefore, to start our research by investigating more closely how S3 practices were adopted and carried out by the selected regions, before proceeding with any other interesting part

of this study. In this context, RQ1 follows a descriptive approach, with the aim of recognising particular characteristics of the smart specialisation procedures. A set of subsidiary questions include: *Has smart specialisation been perceived similarly by the two regions? If not, why not? Did the chosen regions follow similar smart specialisation methodological approaches? If not, why not?* The first two questions are closely related to the different meanings that smart specialisation can take across regions. In fact, both questions stimulate an inductive approach to identify specific variables that can provide an explanation of why regions perceive smart specialisation differently. The outcome of this justification can facilitate further the theoretical integration of the smart specialisation logic, as the understanding of its practicability in the regional setting is still a matter of concern (McCann, van Oort, and Goddard 2016; Capello and Kroll 2016). The other two questions are seen as a continuation of the previous ones, dealing with the identification of the resources and tools that each region exploited for the purpose of smart specialisation. Another sub-question which can also have a supportive role towards building further the empirical framework of S3 is: *What are the practical difficulties and the main challenges for appreciating smart specialisation?* All these questions have a descriptive character. An analytical understanding of RQ1 will move our research forward by putting the basis for studying and understating RQ2 and RQ3.

RQ2: How do, and can, institutional arrangements and governance reforms impact on smart specialisation practices?

RQ2 consists of two parts. The first part (*how do*) examines the current situation and seeks to achieve an analytical understanding of how the existing institutional arrangements and governance systems influence the implementation of smart specialisation in the two regions. It is intended to examine whether and how the present institutional and governance setup has affected the ongoing implementation of smart specialisation strategies up to now. As the S3 process has begun over the last few

years, it is critical to investigate if and what institutional arrangements have been put in place to support the development of smart specialisation practices in the regions. Hence, questions attracting both academic and policy interest are raised: How is governance impacting on smart specialisation at present? Do the existing institutional arrangements facilitate the implementation of smart specialisation in practice? Have the two regions considered and introduced different types of reforms in an attempt to support the design and implementation of S3 effectively? Have such reforms already affected the ongoing smart specialisation practices, and if so, in what ways? The second part of the question (*how can*) is based on the previous analysis and follows an evolutionary approach by seeking to examine how practices in institutional arrangements and governance might be evolving over time to support the implementation of smart specialisation. The investigation into how institutional arrangements and governance reforms may affect S3 concentrates both policy and academic interest, see for example (EC 2014d; Grillitsch 2015; McCann and Ortega-Argilés 2014). At a practical level, this approach will support our understanding about what new institutional and governance structures are needed for the regions and how particular reforms can productively affect the development of smart specialisation strategies in practice. The main objective of the second part is to move from "what is there" to "what is missing" and empirically to show "what is required" in terms of institutional and governance reforms in order for both regions to support the development of smart specialisation strategies.

RQ3: What capabilities exist and are required to develop smart specialisation strategies in catch-up regional environments?

This question is a continuation of RQ2. It aims to explore and understand what capabilities are relevant to support potential institutional and governance transformation and to favour the implementation of S3 in catch-up regional environments. RQ3 addresses this challenge by falling into two separate but related

sections. The objective of the first section is to systematically identify what types of capacity building are currently available to develop S3 in the case study regions. While capacity building is seen as a critical process for developing S3 (Foray 2016; McCann, van Oort, and Goddard 2016), we still lack fundamental knowledge as to what forms of capabilities would be the most appropriate to overcome a number of place-specific implementation challenges of S3 in Crete and CM. Practically speaking, we do not know what capabilities are required for developing S3 effectively, because we do not know what capabilities currently exist at both the micro- and meso-level. Taking into account that both micro- and meso-level competences are needed for success in regional development, (Morgan 1997; Iammarino et al. 2012; Malmberg and Maskell 1997), RQ3 investigates both levels. The micro-level refers to the ability of local actors (firms, universities, regional authorities et al) to constantly exploit various localised resources and competences to develop S3 in practice. The meso-level investigates capacity building from the regional perspective, relying on the logic that capabilities are seen as a pre-condition for successful catch-up (Kim 1980; Lall 1987; Abramovitz 1986). In this respect, the regional dimension is focused on capabilities that are based on various systemic elements that are normally embedded in the wider institutional environment of the local actors; these forms of capabilities are not strictly developed within organisations' borders but rather are distributed across a set of heterogeneous actors. To answer RQ3 systematically, it is important to examine in what sense different forms of organisational and regional capability building are directly linked with S3 practices, and how particular aspects and elements of these capabilities can affect its implementation in the regional setting. This part has been studied analytically in chapters 2 and 3 (literature review and conceptual framework chapters). The focus is mainly on those capabilities which seem to have a direct impact on innovation policymaking and regional development, including *social capabilities* (Abramovitz 1986; Ohkawa and Rosovsky 1974); *networking capabilities* (Walter, Auer, and Ritter 2006);

technological capabilities (Kim 1980; Lall 1992); *innovation capabilities* (Kim 1997); and *absorptive capacity* (Cohen and Levinthal 1990).

4.3 Strategies for answering research questions

To achieve an analytical approach and answer the RQs thoroughly, this study elaborates a combination of research strategies in both stages of data collection and analysis. A mixture of inductive and abductive research approaches is employed. Furthermore, in chapters 6 and 8, which address RQ1 and RQ3 respectively, the inductive approach is used to move from general observations to inferences. Specifically, with regards to chapter 6, we follow an inductive logic to collect evidence from Crete and CM, with the objective of building epistemological assumptions and deriving a solid understanding of the way the selected regions have developed their S3. We gather a mixture of primary and secondary data to explore, describe and model the way in which the case study regions developed their own S3 action plans. Chapter 8 (RQ3) follows also an inductive reasoning to understand what forms of capacity building are relevant for the implementation of S3. The reason for selecting this particular strategy for these two empirical chapters derives from the difficulty of generating and testing hypotheses. Particularly, the absence of previous empirical evidence (this is the first time that S3 practices have been examined and described analytically for Crete and CM), suggests that an inductive bottom-up approach would help us move from particular observations to broader empirical generalisation and theory conceptualisation. Also, we considered Blaikie (2009) who suggests that 'what' questions are better answered with inductive research strategies. For chapter 7 (RQ2), we use an abductive strategy which is essential to answer *how* questions (Blaikie 2009). An abductive reasoning will help us to explore further our epistemological assumptions which are concerned with how institutional arrangements and governance reforms impact S3 practices. This type of question is closely related with understanding and bringing about change. Table 4.1 provides an overview of the research strategies

employed to answer each RQ separately. Also, it shows the correspondence between questions and empirical chapters.

Table 4.1 Summary of research strategies

Empirical Chapters	RQ	Type of RQ	Research strategy	Nature of research	Aim/Purpose
6	1 st	what	inductive	descriptive	Explore, understand & model regional practices for S3 development
7	2 nd	how	abductive	exploratory	Understand how institutional arrangements and governance reforms impact S3 practices
8	3 rd	what	inductive	exploratory	Understand capacity building effect in the S3 context

Source: Author

4.3.1 Case study approach and selection

A case study is a commonly used method for conducting social science studies (Yin 2003b). To investigate the research objectives effectively we use the case study approach as an analytical research strategy, aiming to examine S3 practices in specific regional environments. The case study methodology was considered as the best means for developing this study, because it allows a systematic investigation which takes into account the wider context (e.g. territorial, historical) in which regional innovation policies are designed and developed. In addition, through a case study research, a mix of methods to gather the data can be used, including systematic interviewing and ethnographic approaches. Yin (2003b) emphasised that when phenomena have not been studied in detail (this fits well with the case of S3 implementation), the use of in-depth case studies might be an ideal research option to collect empirical evidence. In earlier work, the author argued that case studies are suitable for answering *why* and *how* questions (Yin 2003a), which fit the descriptive and exploratory nature of the research questions. In this respect, the thesis elaborates a case study in which both

descriptive and exploratory approaches are employed. We use the following definition cited in Yin (2009, 17) to describe the meaning that the case study takes in this thesis:

The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions, why they were taken, how they were implemented, and with what result (Schramm 1971)

We are interested in studying the impact of capacity building on S3 in catch-up regional environments, which have been at the top of the cohesion policy agenda (EC 2014c). To this end, we selected two different regional case studies from S. European peripheries and from Greece in particular: the region of Crete and the region of Central Macedonia (CM). Each region constitutes one single case study and it is examined separately as a unit of analysis. Both cases follow a descriptive and explanatory route (Yin 2003b), seeking to examine S3 practices analytically. The sampling strategy which is used is purposive rather than random; precisely, we have selected Crete and CM from among other Greek or EU regions at the Nomenclature of territorial units for statistics-NUTS2 level⁴ because they simultaneously:

- i. have been hit drastically by the macro-economic crisis in Greece; the economic crisis raises additional implementation barriers to S3 (Morgan 2017), beyond those already existing in catch-up regional territories;
- ii. possess strong academic potential at the local level, (because it is universities and research centres that are expected to play a dominant role in the development of S3 where critical mass in innovation is limited);
- iii. represent a relatively higher innovation and technological profile as compared to the national average;
- iv. design and implement their own regional innovation strategies;

⁴ further information: <http://ec.europa.eu/eurostat/web/nuts>

v. are currently in the process of developing S3

4.4 Data collection and analysis

To collect the data and ensure their utility and integrity, a triangulation approach was followed (Bryman 2004), using both primary and secondary sources. Secondary data were exploited to obtain an understanding of (i) the ongoing literature around the subject of this thesis and (ii) the existing environment of the case study regions and their level of development. Primary data (both audio and textual) were collected by means of semi-structured interviews and observation to answer the RQs analytically. Table 4.2 summarises the sources of primary and secondary data, which are discussed thoroughly in the following sections. As to the primary data, a detailed list of all interviews and S3 events is presented in the Appendices.

Table 4.2 Sources of primary and secondary data

Data	Sources	No
<i>(a) Primary</i>	semi-structured interviews	50
	observation from S3 events	14
<i>(b) Secondary</i>	policy & academic papers, text books	545
	thematic studies	10
	official statistics	9
	reposts related to regional innovation action plans	5
	S3 reports	3
	official speeches	4
	public records and PPPs	10

Source: Author

4.4.1 Secondary data collection

Secondary sources are based on a documentary analysis, exploiting existing data gathered by thematic studies, statistics and figures from electronic databases and the national census, regional innovation action plans and other available reports related to regional innovation and smart specialisation, published at both the regional

and national level. We also explored official speeches, public records, power point presentations and other relevant S3 documents, that were freely available for the two regions. Inspired by the work of Scott (1990), four main criteria were employed to identify and study the most appropriate textual materials for this thesis: *authenticity* (documents gathered from official sources such as regional and national authorities, scientific work etc), *credibility* (documents with a high-level of trust and accuracy), *representatives* (typical documents which cover sufficiently thesis subject in both case study regions) and *meaning* (adequate, available, understandable and comprehensive documents). The main sources of the data included government departments and authorities, statistical offices, documentation centres, trade associations, EU, Eurostat, OECD, universities and research centres. The reason we have chosen official sources is that most of these organisations provide a detailed description of the methods used to gather their data, allowing us to assess data validity and credibility. To develop the literature review of this study and build the conceptual framework, we also used a large number of policy and academic papers, books and technical reports. Additionally, the inputs of both the documentary analysis and the literature review were used to support the design and setting of the semi-structured interviews.

4.4.2 Primary data collection

As regards to primary data, the evidence is gathered by using a mixed method approach. Semi-structured interviews are the central means of collecting the data. Observation was also used as a complementary means of gathering information to evidence additional empirical data. Both methods were conducted in the case study regions in Greece using local sources.

Observational research in the region of Crete

Participant observation took an ethnographic form (Fetterman 1989; Jorgensen 1989) and was carried out through direct participation in diverse S3 events, informative

workshops and public consultations that have been conducted in the region of Crete in the period 2015-17. While interviews were the main method used to collect the data, observational research was also employed to obtain supplementary information from the Cretan environment. We simultaneously exploited both methods (interview and observation) for two main reasons. Firstly, observation provided opportunities for extended discussions with local experts which, apart from the information provided directly through observational research, helped us to design and then modify the interview guides accordingly. Practically, observational research helped us plan the interviews in advance and, therefore, get them better prepared. Secondly, observation enabled a kind of probabilistic snowball sampling approach (TenHouten, Stern, and TenHouten 1971), in which the discussions with local experts provided suggestions that led to the identification of additional respondents, beyond those already identified in our unit of analysis. The main objective of the participant observation was to understand how locals from different stakeholder groups address S3 challenges. We were highly interested in identifying and analysing different understandings, opinions and ideas that local actors from diverse stakeholder groups possessed about S3 and its implementation in the regions.

Observational research (see Appendices for details) was conducted only for the region of Crete, due to time and budget limitations. My current professional position at the Science and Technology Park of Crete (STEP-C) allowed me to attend a number of local S3 workshops organised in the region of Crete. Given that STEP-C routinely acts as a key local player for regional development and entrepreneurship, I was given the opportunity to participate in a series of smart specialisation events not as an innovation expert, but rather as a social science researcher. In particular, with the consensus of the participants (they were officially informed about my PhD research in Crete and CM) my role was not to represent STEP-C in the meetings (representativeness was achieved from STEP-C colleagues) but to observe participants'

understanding, roles and behaviours around S3 practices. This helped to avoid conflict of interest.

No tape recorder was used in observation research in order to comply with the National Data Protection legislation, and avoid critical ethical considerations. For the analysis, hand-written notes (memos, minutes etc) were used to record the results of the observation. We secured our participation in at least six thematic workshops organised during the self-identification process, as well as in two local consultations and one S3 Platform peer-review workshop organised by the EU (see Appendices for details).

Semi-structured interviews

In social research, personal interviews may be structured, semi-structured, or unstructured (Bryman 2004; Yin 2003a). Each form has advantages and disadvantages and its usefulness and appropriateness relate to the nature and type of research being conducted. For example, structured interviews are particularly well-suited for quantitative survey research (Bryman 2004), while semi-structured interviews are usually encountered in case study research (Hancock and Algozzine 2006). At the time of conducting this study, the design and in particular the implementation process of S3 included uncertainty and difficulty in the sense that little was known about how S3 policymaking and policy action would be best applied in the regional setting. Consequently, in order to collect as many data as possible, we performed semi-structured interviews, aiming to allow new emerging questions and relevant topics to be embedded in the discussion, providing added value to the study. Besides, semi-structured interviews are a very common type of gathering data in case study research (Hancock and Algozzine 2006), in which open-ended questions allow for generating research hypotheses (Yin 2003a). The flexibility provided by semi-structured interviews (e.g. attaining enriched personalised information, changing in the sequence of questions according to the discussion), allowed us to gather appropriate amounts of

data and study the participants' views, experiences and attitudes on specific matters of our topic of interest.

Interviewing took place in the period 2015-17. With the consent of the respondents, interviews were tape-recorded, except for two for which an official permission was not given by the participants for individual reasons. All respondents were interviewed individually in Greek which is the local language of both case study regions (see interview list in Appendices). Despite the problems that translation can bring (e.g. time-consuming process, textual equivalence in translation), we decided to perform interviews in the local language and keep interview responses anonymous, by replacing names with codes. This process allowed us to give respondents further flexibility to express their ideas and opinions freely. In general, five main steps were taken in order to carry out interviewing:

1. Designing (preparation of RQs, interview guides per target group, participant information leaflet)
2. Pilot testing (ensure questions are simple, clear and workable; secure appropriate means of interviewing)
3. Interviewing (leading an informal conversation to answer interview guide questions and questions emerging during the discussion)
4. Transcribing and translating (listening in Greek, transcribing in English)
5. Analysing and interpreting (use of NVivo for continual analysis of obtained data and identification of answers to RQs being investigated)

Interview data

In total, fifty personal interviews were conducted with high-level national and regional innovation experts, academics from state universities and public-funded research centres, local entrepreneurs, and representatives from a varied range of intermediary organisations (e.g. science parks, incubators, business networks and

chambers). We identified and selected respondents whose knowledge, opinion and experience could lead to important insights for the RQs. The criteria for selecting particular respondents included the following:

- i. Relevance, engagement and role of the respondent in regional innovation and development with a particular focus on S3. For example, from the public-sector perspective, we identified top-hierarchy S3 co-ordinators to participate in interview discussions.
- ii. Respondents from both the private and public sector, in the sense that we were interested in institutional and individual opinions with private and public policy interests
- iii. Representativeness of respondents from different stakeholder groups with diverse developmental tasks in the regional setting (e.g. entrepreneurs, policy makers, academics)
- iv. Ease of access to interviewees, willingness to participate (e.g. examining reasonable means of identifying and gaining access to respondents)

In this respect, all respondents had either a direct or indirect involvement in regional innovation strategies and particularly in S3 at different levels of development (design, implementation and evaluation), ensuring wide representativeness in both regions. To present an overview of the sample, we grouped interviewees into three main categories: public sector, academia and private sector. The composition of the respondents and the types of stakeholder groups included in each of the three categories are presented separately for each region in Table 4.3.

Table 4.3 Composition of respondents

Group of respondents	Crete		C. Macedonia		TOTAL	
	No. of respondents	(%)	No. of respondents	(%)	No. of respondents	(%)
Public sector ¹	11	36.7	10	50.0	21	42.0
Academia ²	6	20.0	4	20.0	10	20.0
Private sector ³	13	43.3	6	30.0	19	38.0
TOTAL	30⁴	100.0	20	100.0	50	100.0

Notes:

¹Public sector (regional administration, public agencies, policymakers)

²Academia (universities and research centres)

³Private sector (firms, intermediaries, networks, clusters, associations, innovation facilitators, business clubs, chambers of commerce)

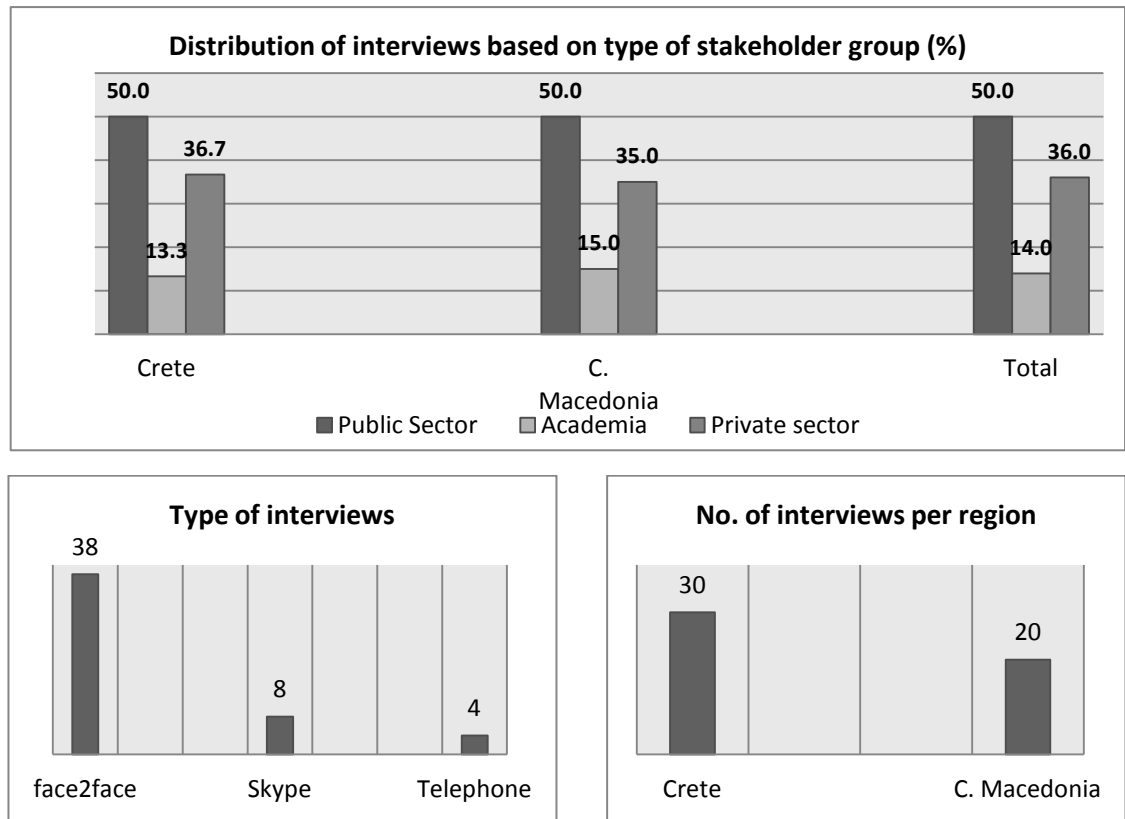
⁴Includes 10 interviews from the longitudinal study

Source: Author

Analytically, we carried out 30 interviews for the region of Crete and 20 interviews for the region of CM (see Figure 4.1). We performed more interviews in Crete, due to the second part of the longitudinal study conducted from August to November 2017. Longitudinal research was undertaken in order to examine S3 developmental trends in the region of Crete and provide further validity to the study. Its outcomes contribute mainly to the completion of chapter 6 which studies the way S3 was developed and progressed in the case study regions. Practically, through the collection of longitudinal data we aimed at providing new insights into the process and continuity of S3. It is worth noting that alongside the interviews, longitudinal research included also the participation in an additional set of S3 events organised in the summer of 2017. We strongly believe that the need for a longitudinal study was essential to collect adequate evidence, given the delay in the implementation of S3 in both case studies.

As illustrated in Figure 4.1, most of the interviews were conducted face-to-face (76%). Skype technology (16%) and telephone (8%) were also used to reach a small number of the respondents mainly from the region of CM. We note that the basis for conducting fieldwork in both regions was Crete. The distribution of the interviewees per stakeholder group was based on the criteria discussed above as well as on the availability of the individual respondents.

Figure 4.1 Characteristics of interviews



Source: Author

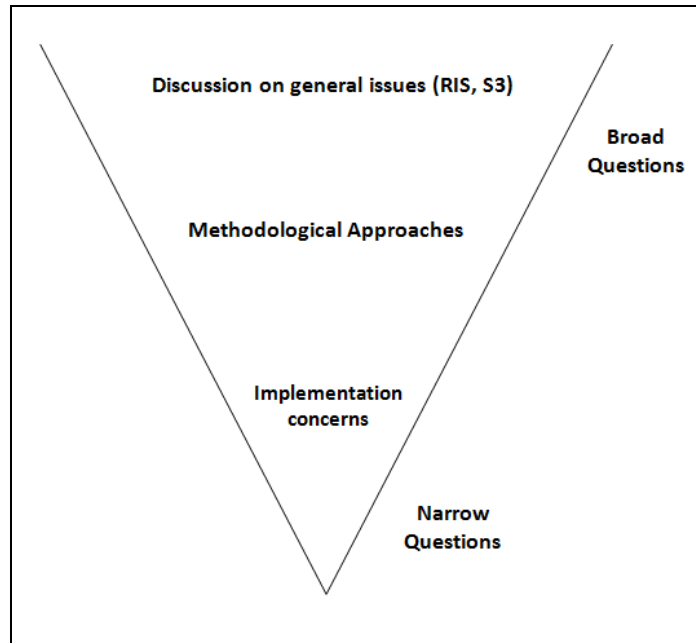
Interview instruments

Two basic tools have been designed and prepared in order to reach interview respondents: the interview guide and the participant information leaflet. Additionally, a detailed informed consent form was sent to respondents to provide information about the research and obtain the required approval (see Appendices).

a) Interview guide

The purpose of the interview guide was to facilitate the interviewing process by asking pre-determined questions. It was developed to encourage a detailed interview discussion and to help achieve the research objectives by using a set of open-ended questions. Patton (2008) suggests that open-ended interviews depend upon inductive analysis, which was selected to address two of the RQs. The guide was prepared and piloted in advance to ensure appropriateness and clarity. In terms of its logic and questioning order, the more general questions were asked at the beginning aiming to motivate respondents' interest and to prepare the discussion for more difficult questions related to the implementation of S3 (Figure 4.2).

Figure 4.2 Questioning strategy



Source: Author

We created a central interview guide as a base line, which was adjusted according to the respondents' target group (e.g. academics, entrepreneurs, public agents). For the longitudinal research an upgraded interview guide was prepared and used. We created simple questions to elicit respondents' opinions and allow them to discuss topics that diverged from the guide.

b) Participant Information Leaflet

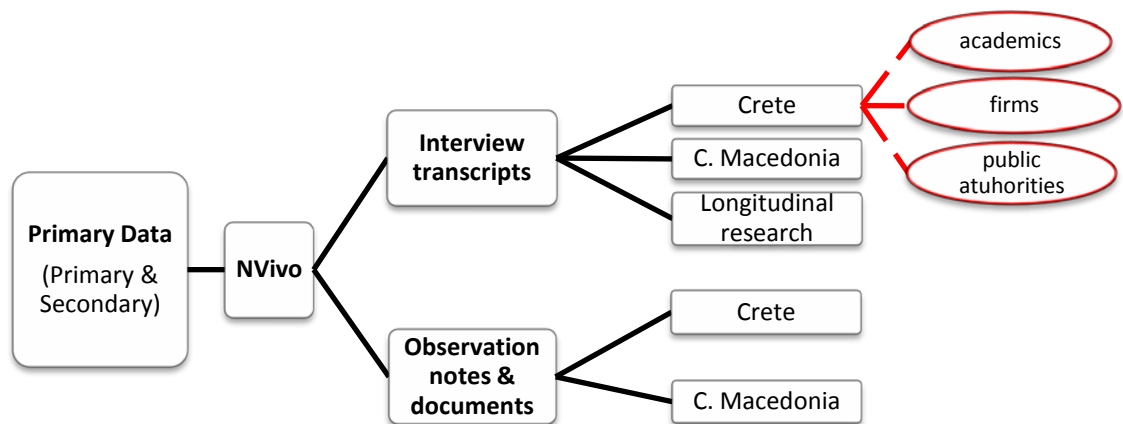
Along with the interview guide a *Participant Information Leaflet* was sent to explain the purpose and scope of the interview as well as other crucial issues such as trust and confidentiality.

4.4.3 Data analysis

As Marshall and Rossman (2006, 111) point out, data analysis is the "*process of bringing order, structure and meaning to the mass of collected data*". Given that the in-

depth interviewing generated an enormous amount of textual information, NVivo (Ver.7) was used to organise and analyse the data effectively. NVivo was essential for elaborating this study for at least two important reasons. Firstly, to overcome the difficulties in analysing a huge amount of non-standard data and to make the process of discovering tendencies and deriving conclusions much easier. And secondly, to secure a quick and easy access to the datasets. The majority of the interviews were transcribed, translated (from Greek to English) and inserted into NVivo for the codification process. Though there are plenty of professional software packages to help transcribe audio recordings, no computer-based word-processing program was used, as transcription and translation were conducted simultaneously. As illustrated in Figure 4.3, both observation notes and interview transcripts were grouped into different folders per regional case study. Data processing and analysis was conducted separately for Crete, CM and the longitudinal research, allowing for single analysis in each regional environment or for comparisons between the case study regions. Datasets were also divided into three stakeholder groups: *public sector*, *academia* and *firms*, which allowed us to make some initial estimates as to how better to arrange and analyse the data.

Figure 4.3 Organisation of data



Source: Author

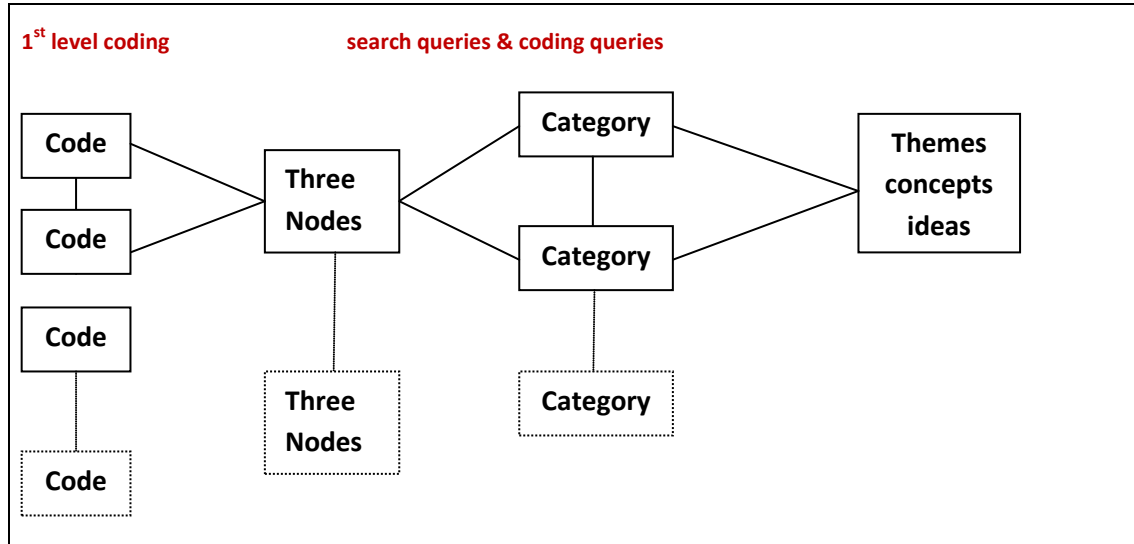
Codes, nodes and queries

To build knowledge of the data, interview information was allocated to specific coding schemes and meta-categories. Miles and Huberman (1994) define coding as *"labels for assigning units of meaning to the descriptive or inferential information compiled during a study"*. To start the codification process in NVivo, we created a large number of thematic tree nodes (in the sense of hierarchical order with categories and sub-categories) for each RQ separately, by coding primary data from the categories of Crete, CM and longitudinal research (see Figure 4.3). Richards distinguishes codes and nodes, pointing out that *"nodes are the ways of storing ideas and the coding of documents"* (Richards 1999, 69). After reading line-by-line the interview transcripts several times, we developed the first coding schemes to start the analysis and allow for flexible comparisons between the two regions and among the three stakeholder groups of our interest (public sector, academia and private sector). Data were inserted in such a way as to analyse single or combined variables and sources. Codification was theme-based and repeated several times (re-coding) during the phase of analysis to understand its connection to the objectives of this study. Usually, the codes included single sentences, descriptive phrases, or entire paragraphs which revealed a series of analytical concepts. A number of participants' statements were used directly in the study to elucidate indicative tendencies and findings.

For the analysis of chapters 6 and 8 an inductive reasoning was carried out in the process of coding, in which general tree nodes were created to collect and study specific data for potential generalisations. For example, in chapter 6 two main categories were created in NVivo, one for each region. In total, we generated 325 code references from which 34 single quotes (19 for Crete and 15 for CM) were used to evidence our findings. In chapter 7 we created 2 main nodes with a number of sub-nodes including 470 coding references, while in chapter 8 a total number of 266 quotes were created in NVivo, from which 34 single quotes were used in Part A and 19 in Part

B. The method of our work is presented in a simplified form in Figure 4.4 diagrammatically.

Figure 4.4 From codes to theory: a streamlined model



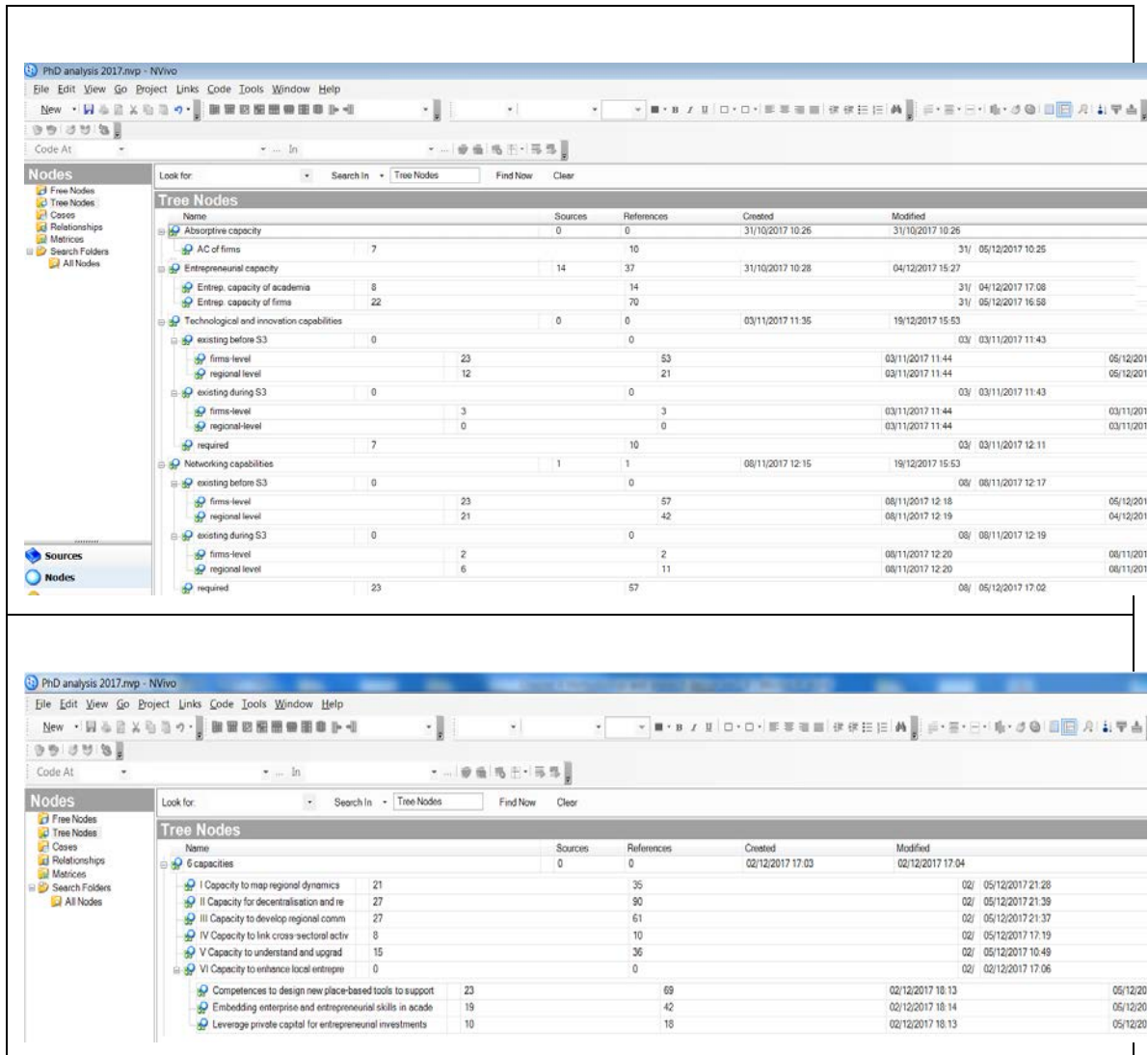
Source: Author

After first-level coding in which all tentative answers were elaborated, we reviewed all data again and performed a recombination of coded passages, by grouping the existing nodes into new tree nodes to move to the second level of interpretation. The number of nodes at this stage of analysis was lower compared to the beginning, while each node included only one concept/theme. We ran the coding again and created a new series of codes and sub-codes (new codes or codes from already coded data) to test in what ways emerging patterns and ideas from the interviews were related to the RQs. To identify patterns of association among different groups of tree nodes and to create categories, we ran several queries such as text search queries and coding queries in specific sources to find ideas and content coded at selected nodes (e.g. identify what entrepreneurial capabilities are existing in the case of Crete only), or at a combination of nodes (e.g. study how academics or local firms treated the challenge of the entrepreneurial discovery in CM only). We also used handmade

memos which were written during the interviews and observation, to identify and explicate emergent patterns in the data as we were re-coding the nodes. This second round of codification helped to minimise the datasets, by keeping those that related most to the RQs and the theory we have elaborated in the conceptual framework. Finally, we elaborated the categories created during the previous stages to generate themes, concepts and ideas related to the RQs.

To show how tree nodes and coding have evolved during our analysis, we use an example from the analysis of the data we used to answer RQ3: What capabilities exist and are required to develop smart specialisation strategies in catch-up regional environments? Figure 4.5 illustrates how a large number of specific sources codified in various tree nodes have been reduced for generalisation into six types of capacity building.

Figure 4.5 NVivo analytical information categories for RQ3



Source: Author

Figure 4.5 shows that in the beginning of the analysis, a broad number of nodes (4 nodes, 16 sub-nodes) were used to code data for RQ2, while at the end, the analysis came up with 1 key node and only 9 sub-nodes. This process shows how from a massive amount of textual data, we have moved to specific patterns and ideas.

4.5 Ethical considerations

The ethical issues in this study concerned issues of informed consent. Data was collected exclusively for this thesis and used to examine the selected case study regions. All materials obtained from secondary analysis were public, while interviews were held with consent of participants. In conformity with good ethical practice, we asked for permission to record and use the interviews for the purpose of this research. Although participants did not share sensitive or personal information, confidentiality was secured by keeping their identities secret. Anonymization was secured by using pseudonyms.

4.6 Case study specificities

As in any case study research, we recognise a number of specificities regarding the methodological approach. First, since the data were entirely gathered from Crete and CM, our findings refer exclusively to these particular regions. In this respect, our conclusions may not be necessarily transferable to other regional contexts beyond Crete and CM, acknowledging the risks highlighted by the *one-size-fits-all principles* (Tödtling and Trippel 2005). The second specificity is linked with the progress of the selected regions in developing S3. In particular, given that the case study regions have not yet fully put their S3 action plans in place, it is difficult to identify and analyse in a certain research design all possible implementation challenges at once. Consequently, part of our analysis takes necessarily an indicative approach which remains to be proved during the implementation phase in both regions. As a final specificity we refer to the restricted availability of updated secondary data which has been used to analyse both regional contexts (e.g. reports, regional studies etc). Most of the secondary sources we have used neglect the way local financial crisis has ultimately affected the regional ecosystems.

4.7 Conclusion

The study of this thesis required the elaboration and development of an analytical research design with specific and comprehensive units of analysis. The details of this research design have been explicitly presented, analysed and justified in different sections of this chapter. The case study approach has been selected as a core means of developing our epistemological assumptions for the regions of Crete and CM, for which systemic interviewing and observational research were used for the collection of primary data. In the introduction, we highlighted that this is a qualitative study which is not intended to gather and use numerical evidence to generate statistical generalisation. Rather, we used case study research to develop theory and to produce an analytical generalisation in our unit of analysis. In this respect, statistical generalisation is well distinct from analytical generalisation, which has been extensively applied to fulfil the research objectives of this study.

Apart from the importance of discussing the main strategies used to build research tools and address research questions, chapter 4 has also drawn attention to the evolutionary approach of the research methods employed to address the particularities of our research. The availability of primary data, their connection to research objectives and the need to address ongoing literature gaps were the main reasons for modifying and evolving the pre-scheduled research plan of this thesis.

Chapter 5: Setup of the regions

5.1 Introduction

This chapter provides a detailed overview of the regional profiles of Crete and Central Macedonia (CM). It discusses demographic, economic and social factors that have gradually influenced the productive structure of both regional environments over time. The chapter discusses the extent of changes occurring in the regions' socioeconomic structure before and after the financial crisis of 2008, with the objective of providing the framework for developing the other sections. Primary emphasis is given on the regional knowledge base, as well as, on the research and innovation patterns of public and private sectors in both regions. It also provides a detailed overview of the relationships usually existing among key regional stakeholders which, to a large extent, are still unknown and vague. The chapter takes the following structure: it starts with a brief background of the regions which outlines key regional characteristics, followed by a detailed overview of the economy, industrial and sub-national innovation systems of Crete and CM. At the end, eight basic innovation and R&D indicators are presented, indicating a number of variations in regional performance which allows for regional comparisons between Crete and CM in the decade 2007-2017.

5.2 Background of the regions

5.2.1 The region of Crete

Crete (NUTS2: EL43) is the largest island of Greece and the fifth largest island in the Mediterranean area. Located in the southern part of the country, it covers 8.336 km² with a total coastline length of more than 1000 km. It is surrounded to the north by the Sea of Crete (Aegean sea) and to the south by the Libyan Sea. Due to its geographical position, Crete provides unique opportunities for co-operation and networking with South-East European countries and nations from Middle East and the

North Africa. According to the General Population Census 2011 (ELSTAT 2016), the region is ranked the 5th most populous area in the country with 621.340 permanent inhabitants. The island experienced population gains since 1981; a population increase of 19.7% in the period 1981-2001 and 3.4% between 2001-2011 (ELSTAT 2016). The capital city, Heraklion, is the 4th largest city of the country, surrounded by three main cities found from west to east: Chania, Rethymno and Agios Nikolaos. Administratively, the region of Crete is divided into four prefectures: Chania and Rethymno to the west and Heraklion and Lassithi to the east. Although it is an island, Crete is very mountainous with high mountain ranges and physical constraints. Due to its geographical position and to a number of physical constraints, Crete is more developed in the north coastline, while much of the south part of the region is still sparsely developed. As a result, most of the economic activities are intense in the north part of the island. The history of Crete dates back to the Minoan civilisation, which is treated as the earliest recorded civilisation in Europe, flourished in the period 2600 to 1100 BC (Chaniotis 2010). Minoan Crete declined after the destruction of its capital city Knossos by the tsunami waves of the eruption of Santorini volcano in 1.650 BC. There are many surviving ancient Minoan sites throughout the island of Crete.

5.2.2 The region of Central Macedonia

Central Macedonia (NUTS2: EL52) is part of the northernmost and largest geographical unity of Greece, *Macedonia* which shares borders with the Former Yugoslav Republic of Macedonia (FYROM) and Bulgaria. It is the biggest region of the country in terms of size, covering a total area of 19.166 km², and the second most populous area (after Attica), with 1.882.108 inhabitants, approx. 17.5% of the population of Greece, (ELSTAT 2016). As opposed to Crete, CM covers important lowland areas optimal for high-value agriculture and industrial activity. Traditionally, the business community of the region is economically active and strong in both sectors.

With regard to the administrative division of the region, CM is divided into 7

administrative prefectures: Chalkidiki, Imathia, Kilkis, Pella, Pieria, Serres and Thessaloniki. Thessaloniki is the capital and the largest city and concentrates almost the 60% of the whole regional population. The city of Thessaloniki is regarded as an international exhibition and congress centre and, by tradition, it plays an important role as a financial centre in the Balkans. From a practical perspective, the city of Thessaloniki provides easy access to the Balkans via good road infrastructures and railway networks. Additionally it is considered as an education centre concentrating a significant number of students and academics in interdisciplinary fields.

5.2.3 Geography of regions

This section outlines key indicators of population and geographic structure for the two regions. Moreover, Figure 5.1 illustrates the geographical location of each region in relation to the rest of the country, while Table 5.1 summarises basic geographical and other administrative and demographic characteristics.

Figure 5.1 Geographical location of regions



Source: Author

Table 5.1 Borders, population and administrative units

	Crete	C. Macedonia
Ranking		
<i>Greek regions by size</i>	9 th (8.336 km ²)	1 st (19.166 km ²)
<i>Greek regions by population</i>	5 th (623.065m)	2 nd (1.882.108m)
Population density (people/km ²)	74.54	99.66
Borders	North: Aegean sea, South: Libyan Sea	North: FYROM ⁵ , Bulgaria South: Aegean sea, Thermaic Gulf
Admin. units	4	7

Source: Author

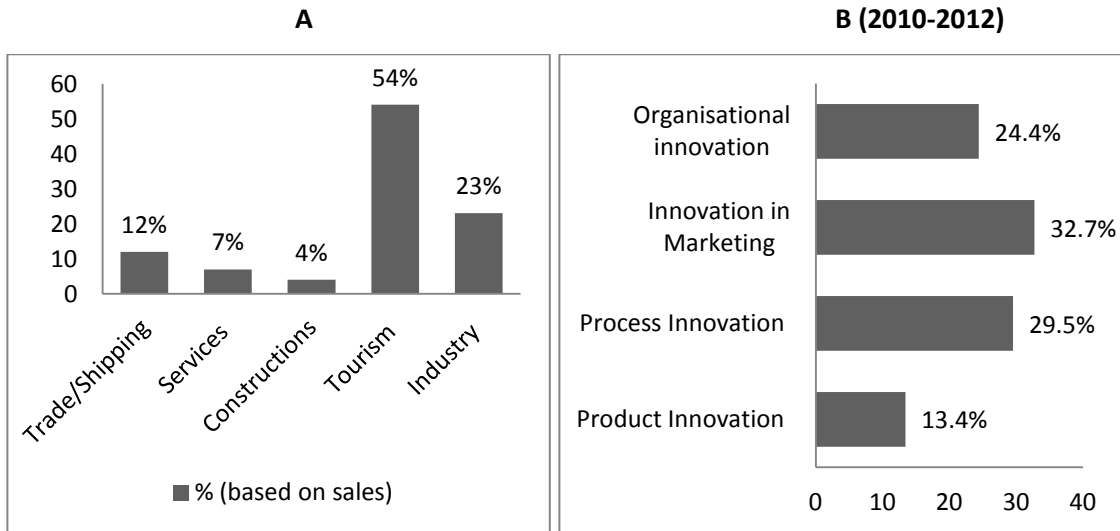
5.3 Cretan economy, industrial and innovation system: an overview

On the whole, Crete has a long-term growth prospective generating approximately 5% of the Greek GDP. Concerning the salient features of the local economy, Crete has shown a long tradition in tourism over time which, currently, is the most active and specialised sector of the island with 54% of the most dynamic companies in the region, followed by services, mainly trade and shipping, with 12% (see A in Figure 5.2). The development of tourism infrastructures (mostly driven by local and international hotel units, tour operators and other related chains) is currently seen as a determinant of regional development with long-term perspectives. While primary sector has a leading role in terms of production and employment, it is still largely based on outdated models of cultivation and fragmented technological infrastructure, which have been accused of hampering the competition of the local economy (Papamichail and Saitakis 2013). However, agriculture (mainly agro-food) is a very promising sector in which vegetables possess a relatively high specialisation index, occupying the 9th place among the other European regions (Region of Crete 2015). In addition, an important part of the agro-food domain (e.g. production of diversified wine varieties,

⁵ *Former Yugoslav Republic of Macedonia*

organic cheese and olive oil) has turned its activities into niche markets and high-quality production, providing the region with opportunities for creating strong potential competitive advantages.

Figure 5.2 Percentage (%) of (A) most dynamic companies per sector / (B) type of innovation



Source: Data collocated and elaborated from EKT (2015a) & Region of Crete (2015)

A mixture of indicators and statistics which have been grouped and presented for the purpose of this study, ranks Crete as one of the best performers in the country in terms of its socioeconomic and STI performance (see Table 5.2). When analysing basic indicators of the economic activity of the region, we see that due to the economic crisis and its adverse impact on the local economy, the Cretan GDP per capita in PPS has been reduced notably since 2008 - a 14% fall between 2008 and 2015 - with significant effects on the business enterprise sector. In the same way, unemployment rates have almost doubled from 2010 to 2017 (first four months), reaching more than 20%, raising important brain drain threats.

Table 5.2 Facts and figures of Crete

Indicator	Value
Size (in square km)	8.336
Population in millions (2011)	623.065
GDP per capita in PPS (2008)	21.400
GDP per capita in PPS (2015)	18.800
Unemployment (2010)	12%
Unemployment (2014)	24%
Unemployment (Jan-Apr 2017)	20.2%
Percentage of innovative enterprises (2010-12)	65,2%
Percentage of enterprises with New Product Development	10,7%
Percentage of enterprises which collaborate for New Product Development	7.5%
Main sectors of economic activity: Primary sector, Agriculture, Tourism, Services	
R&D expenditure in millions (€), 2013	
Indicator	Value
Business Enterprise Sector – BES & Private non-Profit – PNP	6,52
Higher Education Sector – HES	54,72
Government Sector – GOV	59,44
R&D expenditure as a percentage of GDP	1,35%

Source: Author

Concerning innovation and development (see also *innovation conditions* section), the Cretan R&D is largely dominated by the government and higher education sectors, which remain the largest sources of R&D investment. In the private sector, there are a fairly small number of leading companies which conduct high R&D activities and hold 22 active patents. In general, most of these firms can be considered as the top innovation leaders of Crete. The top four in terms of innovation and R&D concentration include Plastika Kritis SA, Megaplsat SA, Mechatrone SA and Cretafarms SA. Interestingly, each of these companies plays an important role in the global marketplace developing all four types of innovation, with a particular focus on product and process innovation (see B, Figure 5.2). The first three companies operate in the industrial sector. They run R&D departments dealing with plastics in horticultural and agricultural markets; specialised packaging materials and renewable energy applications. Cretafarms SA operates in the food industry (meat and deli products) and

it is one of the largest firms in Greece. Additionally, there is a small group of enterprises operating in various industrial sectors that have introduced a series of non technological innovations and have gained international reputation. These innovations are not usually related with product or process innovation, but rather with organisational and marketing innovation, covering 24.4% and 32.7% respectively (see B, Figure 5.2). Interestingly, non-technological innovation is more frequent than product and process innovation, covering almost 43% of the most dynamics companies of the region.

5.3.1 Networks and clusters

In terms of inter-firm synergy and business networking, innovation networks are mostly concentrated in four industrial sectors: tourism, agricultural products, agriculture-livestock and construction. The most well known are the winery network and a number of olive oil associations which are typically run by local producers and entrepreneurs in the field. Additionally, the Agro-Food Partnership which is coordinated by the Region of Crete was built to promote Cretan traditional products overseas. Until that time, the creation of networks, thematic clusters and other forms of collaborative synergies between public and private actors has been collectively attempted through the development of various regional and national programmes conducted over the last 15 years (see for instance CRINNO Project and the Regional Innovation Pole of Crete). It is worth noting that most recently, significant efforts have been made to turn industrial and businesses networks to R&D clusters, without however fulfilling this ambition systematically; its realisation requires time-consuming processes and collective endeavours emerging from cross-sectoral interaction. A leading role in this process was undertaken by the Science and Technology Park of Crete (STEP-C), which habitually acts as an intermediate between the local enterprise sector and the research community of Crete. In fact, STEP-C was found to play an important institutional role in bridging industry-academia gaps, by supporting the

development of science-business collaborations. However, an adequate number of effective R&D clusters, business networks and other similar structures and innovation accelerators are still missing from the regional innovation system of Crete. Apart from the Hellenic Photonics Cluster initiated by the Foundation for Research and Technology (FORTH-HELLAS) to support a limited number of innovative enterprises active in diverse areas of photonics, no other similar initiatives have been conducted up till now.

Traditionally, strategic co-operations in the private sector are conducted on an ad-hoc basis, largely dominated by personal relations. The complexity of setting business and R&D networks is path-dependent affected by different types of systemic failure (e.g. market failure, government failure etc), as empirically found by other similar studies in diverse regional environments, see for example (Von Tunzelmann et al. 2010). Likewise, no competence centres or innovation platforms across diverse disciplines have been actively established to support technology and innovation actions, with the expectation of the new innovation platforms initiatives designed and run under the RIS3 framework. This initiative is expected to have a particular role in supporting and promoting the development of business-research partnerships in the smart specialisation context.

By analysing the complexity of institutions' collaboration in specific domains of the local economy, we see that even in the ICT sector where Crete shows a relatively higher innovative and entrepreneurial performance due to the existence of the strong research and technological infrastructure in the field (e.g. University of Crete Computer Science Department, Institute of Computer Science at the Foundation for Research Technology), no significant agglomeration spill overs have been generated to provide an added value to the local economy. While literature suggests that clustering tends to be pronounced in high-tech industries (Delgado, Porter, and Stern 2014), for example, electronics and computing etc, in the case of Crete, ICTs and other interactive networking applications have been individually exploited (e.g. installations of ICT applications developed by local research institutes are found in Cretan airports for the

promotion of the local tourism product). A representative sample gathered by the respondents from the ICT business community of Crete suggests that while local companies and entrepreneurs have started recognising the implications of business clusters and industrial R&D networks on business performance, they still consider such structures with scepticism, fearing loss of competitive advantage through the exchange of entrepreneurial ideas and business secrets. This conservative view has been extensively recorded in the interviews conducted with a number of smart specialisation organisers, highlighting the reluctance of some local entrepreneurs to share their entrepreneurial ideas for setting up business and technological synergies during the open process of the entrepreneurial discovery. In contrast with this position, the Cretan S3 document indicates the crucial role that thematic clusters can play in various fields of the local economy and rank the formation of a series of cluster-based initiatives as a high priority during the entrepreneurial discovery.

5.3.2 Knowledge and business infrastructure

As being one of the most innovative regions in Greece, with a relatively long tradition in innovation (the percentage of innovative enterprises in 2010-12 was above the Greek average 65.2%, see Figure 5.2), one could expect that Cretan business sector is going to play a key role in the modernisation of the new regional innovation policies of the country. Similarly, from a RIS3 potential, Crete demonstrates a significant concentration of scientific research potential, hosting a noteworthy number of well-established centres with scientific excellence in innovative ICTs and in Key Enabling Technologies (KETs). While the innovation performance of the island has decreased considerably during the last two years (approximately 19%), it is argued that the region of Crete still possess *"an important concentration of cultural and natural resources that can boost the creation of new sustainable development"* (Region of Crete 2015). From the one hand, this is due to a number of internationally recognised research bodies and higher educational centres (see section A in Table 5.3) which have contributed crucially

to the creation of a strong local research community with international knowledge linkages.

Table 5.3 STI infrastructure of Crete

Institution	Size/performance	Location
A. Academic Institutions		
University of Crete	5 faculties, 16 departments	Heraklion & Rethymnon
Technical University of Crete	5 faculties 16 depart/sectors	Chania
Technological Educational Institute of Crete	5 faculties, 15 departments	Heraklion, Rethymnon & Chania
B. Research Centres		
Foundation for Research and Technology	6 institutes	Heraklion & Rethymnon
Dimitra Greek Agricultural Organisation	6 institutes	Region of Crete
Hellenic Centre for Marine Research	Marine research	Heraklion
Mediterranean Agronomic Institute of Chania	Research & Education in Mediterranean Agronomic Studies	Chania
Institute of Geology & Mineral Exploration	Earth science	Rethymnon
C. Private sector <i>(Clusters, networks, SMEs associations, intermediaries, firm R&D hubs, incubators)</i>		
Science and Technology Park of Crete	Business incubators (appr. 15 companies)	Heraklion
Help-Forward	Technology transfer mechanisms, industry academia collaborations	Heraklion & Rethymnon
Chambers	Entrepreneurial Hub, SMEs support	Region of Crete
Industrial Zones	Industrial agglomeration	Region of Crete
Development Agencies	SMEs support	Region of Crete
Hellenic Photonics Cluster	10 companies, 5 labs	Region of Crete
Wines of Crete	Networking R&D in winery (appr. 20 members)	Heraklion

Source: Author

Interestingly, Crete demonstrates an important agglomeration of public knowledge creators which have exerted a strong influence in generating, stocking and diffusing different types of knowledge. Furthermore, there are a large number of academic institutions and research centres (see A and B in Table 5.3 which access important research funds and attract researchers with multidisciplinary backgrounds with national and international experience. In this respect, Cretan academia provides an important source of high qualified personnel with potentially significant contributions in the local productive system of the island. Indicatively, in 2014, Crete concentrated approximately 4.4% of the entire Greek human resources in S&T, while during the period 2008-2012, the academic community of the island participated in 6.677 publications with 48.301 citations (RIM 2016). Additionally, official data provided by EKT (2015b) shows that Crete possesses the 3rd position among the other Greek regions in terms of the number of participation in collaborative research projects funded by the 7th Framework Programme (FP7) in the period 2007-13. To give a better sense of these significant numbers, we note that the Cretan population in the nation is approximately 5.8% (ELSTAT 2016). On the other hand, despite the existence of a number of key players with intermediary roles in business and innovation (see C in Table 5.3), the private sector seems less effective in creating and making sense of new knowledge-based incentives and assets. The absence of adequate knowledge-intensive industries suitable to support technological development and industrial partnerships strangles the ability of the region to collectively keep high levels of R&D investments in the private sector. Consequently, the business R&D expenditure (as a share of GDP) remains below the European average (OECD 2005), a phenomenon which is particularly pronounced throughout the duration of the economic recession. In such an unfavourable environment, local policymakers and strategists are asked to restart the local economy of Crete by designing new place-based innovation policies which are suited to address the objectives of the new smart specialisation framework.

5.3.3 Non-R&D activities

On the other hand, however, it is worth highlighting the performance of the Cretan companies in non-RTDI activities. Data from the Regional Innovation Scoreboard 2016 ranks Crete in the top 20 EU regions with the highest scores in non-R&D innovation expenditures in SMEs as percentage of turnover (EC 2016). In fact, the nature and process of conducting non-RTDI activities vary across sectors and industrial specialisations. For example, exporting can be well demonstrated under the activities of the Exporters' Association of Crete which support the promotion of the Cretan products abroad and facilitate the access into new foreign markets through various internationalisation channels. Data from the Hellenic Statistical Authority shows that the total export value for Crete in 2016 was EUR 457.7m, dominated by the food sector (62.9%) and the plastic industry (25%) (Exporters' Association of Crete 2017). Within the food sector, olive oil exports account for more than half of the Cretan exports related to food. The majority of these companies can show a relatively good performance without conducting or introducing core R&D-based activities. Similarly, other business associations with a strong presence in the local tourism industry (e.g. various local hotel associations, associations of tourism and travel offices, etc) have played a supportive role in the development and promotion of the local tourism product of Crete, without incorporating research and development practices in their business functions.

5.3.4 Competiveness, innovation conditions and ecosystems

The European Regional Innovation Scoreboard ranks Crete (grouped in the mega-region Nisia Aigaiou, Kriti) as a modest-high innovator (EC 2014e). Although there is a relatively high concentration of public R&D activities with significant participation in EU research programmes, mainly from universities and research centres as discussed above, the commercialisation process and the linkages of the scientific community with the local companies remain relatively low with inevitably negative effects on regional

innovation and competitiveness. Despite the superiority of the Cretan R&D landscape relative to other regions of the country (i.e. critical mass of regionally-based education and research institutions which are not spatially concentrated in a particular district), the increased rate of brain drain in both the public and private sectors is getting an extremely negative dimension, preventing the region to overcome many of its current challenges with regards to its competitive position. Furthermore, data at a national level shows that in the period 2009-2014 some 20.000 scientists left the country in search of better opportunities abroad, while according to the Bank of Greece, 427.000 higher educated young Greeks have immigrated since 2008 (Kathimerini 2017). Under these unfavourable conditions, the medium and long-term competitiveness of the region is further threatened. Currently, recent official data from the 2016 EU Regional Competitiveness Index (RCI) ranks Crete in the 250th position out of 263 EU regions, (see Table 5.4).

Table 5.4 Competitiveness of Crete: ranking and scores

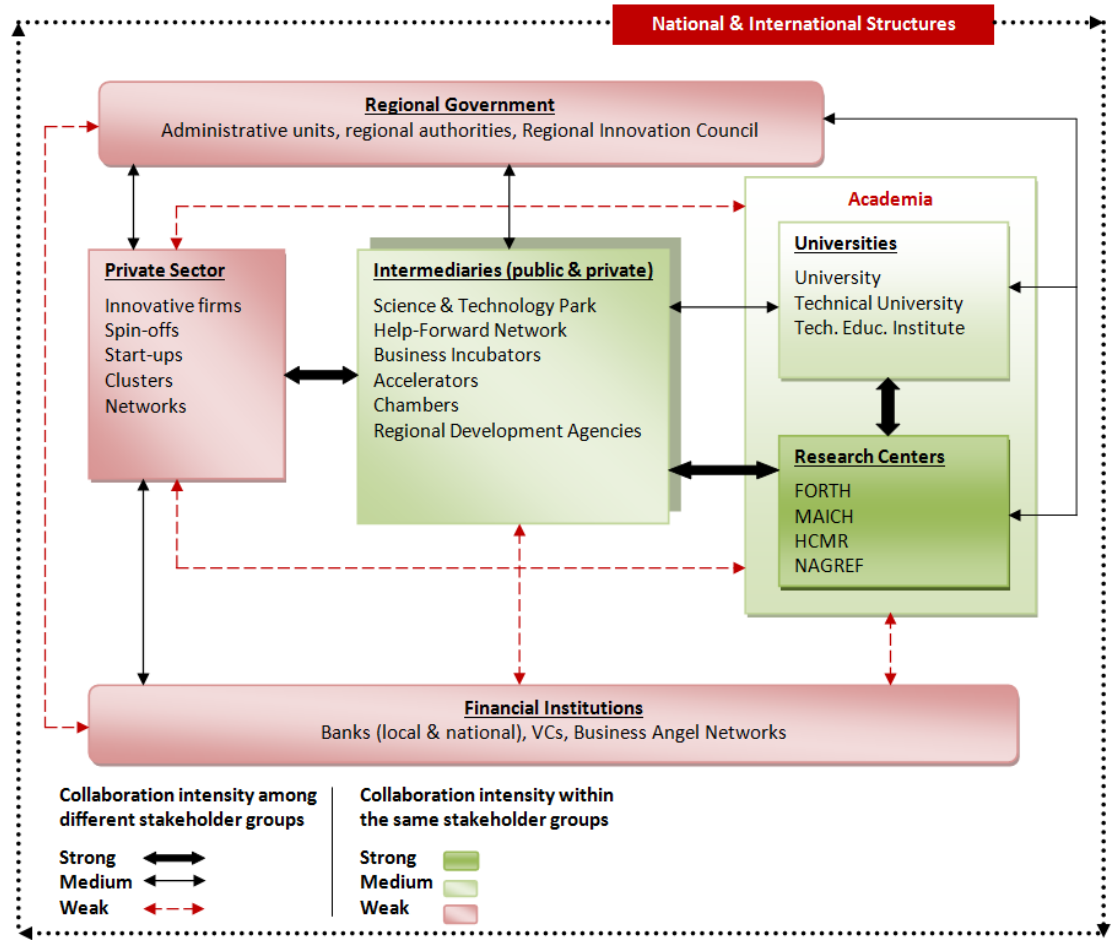
	Rank	Score (0-100)
Competitiveness	250/263	6.6
Innovation dimension	228/263	20.7
Technological redness	236/263	29.0
Infrastructure	238/263	6.4
Business Sophistication	202/263	22.6

Source: Elaborated data from RCI, 2016

By summarising five indicators at a regional level, (Table 5.4) shows clearly an underperformance of the regional competitiveness of the island. A possible justification which can partly explain the above situation is as simple as looking at the Regional Innovation System of Crete and at some of its drawbacks as evidenced in this study: fragmented and weak institutional structure; limited regional power and autonomy; unfavourable environment for innovative and knowledge-based entrepreneurial initiatives; bureaucratic processes; limited number of investments, and of course, the

dramatic effects of the financial crisis, which have drastically affected the competitive environment of the enterprise sector. What happens in practice is that Cretan RIS suffers from the lack of strong and constant synergetic partnerships among the public and private sector and, as a consequence, the research system of the region is sometimes found decoupled from the domestic economy. In this respect, several empirical studies, see for example (OECD 2005; Papamichail and Saitakis 2013; Reid et al. 2012c) have stressed the complexity of matching science with local societal and economic needs due to the lack of soft rather than hard innovation and R&D infrastructures in the region of Crete. Interestingly, various collaboration and knowledge linkages are not only found relatively weak among different stakeholder groups, for example industry-academia partnerships, but also among key local players within the same group, e.g. inter-firm collaborations (see Figure 5.3). This is due to one of the most significant problems of the private sector which is the difficulty to get access into financial resources for innovation and R&D. The latter can partly explain why Crete (despite its strong research community) still lacks critical knowledge intensive clusters and thematic networks in areas where a comparative advantage could exist. Figure 5.3 illustrates the Regional Innovation System of Crete and represents the linkages and knowledge diffusion within and among different stakeholder groups of the island. It is worth highlighting the multidisciplinary dimension that the RIS of Crete can take (it combines diverse sets of scientific knowledge with important specialisations in biotechnology and life sciences, computer-based and ICT applications, physics and laser technologies etc) which provides considerable opportunities for cross-sectoral learning, diversification and technological change.

Figure 5.3 The Regional Innovation System of Crete: linkages and knowledge diffusion



Note (research centres): The regional unit of the Institute of Geology and Mineral Exploration is also located in the city of Rethymnon

Source: Author

A close examination of the micro-environment of the Cretan RIS shows the existence of an enduring challenge to link science with technological knowledge to generate innovations for commercial applications. Put simply, the existing structure of the innovation ecosystem of Crete and its current institutional interactions occurring among its players are not still favourable for generating innovation-driven growth. In other words, innovation, particularly from the business perspective, is not systemic but rather the outcome of a non-collaborative process, which in most of the times is fragmented and conducted individually. This is due to a relatively low tendency of the

regional dynamics to create collective opportunities for intra- and inter-sectoral collaborations with either the private sector (mainly firms, business clubs and associations) or the public organisations throughout the region (e.g. universities and research centres). The term *medium collaboration intensity* is used in the sense that networking and synergies for knowledge production and diffusion are not carried out regularly and formally; for example, promoting technological collaborations between universities and local firms for new product development. On the contrary, instead of taking place in a routine basis, knowledge transfer approaches which are critical for innovation and learning are conducted at an ad-hoc basis, depending on particular needs and circumstances. Respondents from the interviews identify clearly the absent of a set of enduring channels appropriate to allow and promote knowledge spill overs effects. Our findings show high consensus and representativeness on this view; they are gathered by various groups of policymakers with different roles and innovation policy perspectives: academia, business and public sector organisations. Despite the existence of a number of intermediary organisations, the lack of formal communication channels which could be regarded as lack of permanent knowledge systems is still an open challenge for the local community of Crete which still questions the innovation capacity of the region. In the case of Crete, while geographical proximity of diverse local actors (in the sense of spatial concentration of a large number of multi-level players) has been of great importance, its effects on learning and knowledge transfer are still pending.

5.4 Central Macedonian economy, industrial and innovation system: an overview

Central Macedonia (CM) is one of the most important regional economic players in the country, which plays a leading role in the development of the Greek sub-national system. According to the Greek national statistics, the region generates approximately 15% of the national GDP, from which 11.7% is produced in the city of Thessaloniki (ELSTAT 2016). Its regional production structure is distributed in primary,

secondary and tertiary sectors, with particular specialisation in the production of peaches, cotton and tobacco, as well as in processed food, retail and textile finishing products. During the last years, the tertiary sector has expanded its share, dominating the local economy by covering approximately 76% in 2009 (ELSTAT 2016). In addition, other knowledge intensive industries including biomedicine, organic farming and ICTs have started gradually to play an increasing role in the production and diffusion of new entrepreneurial knowledge (Region of CM 2015). Companies operating in these fields are usually hosted in industrial parks and zones, science parks, and other business incubators (see section C in Table 5.6), which traditionally provide practical support and facilities to their tenants. In addition, processing industries, food and chemicals (petrochemicals, plastics, polymers etc), furniture and metal products have also gained the bulk of the economic activity in the region, attracting private investments and public funding. Nevertheless, it is argued that an important number of the local firms operating in these business sectors do not habitually invest in technological innovation, and as a consequence, their competitiveness remains rather static (Reid et al. 2012a). This trend has been captured in a number of regional reports, which has been recently documented in the S3 strategic document of the region. In addition, during the last years, the region has experienced intense deindustrialisation due to the relocation of labour intensive industries to neighbourhood countries, mainly to Bulgaria and Former Yugoslav Republic of Macedonia (FYROM).

5.4.1 Economic crisis and regional recession

From a developmental perspective, the current production structure and the limited range of sectoral specialisation of the region do not facilitate the local economy to absorb shocks arising from the financial crisis. Indeed, the region has suffered importantly due to effects of the Greek economic crisis which has strangled the industrial sector in particular. The extended shrinking of the real local economy has led an important number of SMEs to go bankrupt. Indicatively, according to data provided

by the Thessaloniki Chamber of Handicrafts, a total number of 14.180 firms (mainly craft business) were out of business (companies filed for bankruptcy) over the last eight years (2000-2017), while for the same period, only 5.527 new companies were founded (Alpha965 2017).

In the same vein, close attention to the macroeconomics of the region shows a fairly similar situation. The GDP per capita (in PPS) decreased remarkably during the period 2008-2015 (by apr. 22.2%) while in 2010-2014 the official unemployment rates of the region grew dramatically (by 109.5%) (see Table 5.5), leading to significant brain drain effects, especially for science and technology educated people who left the region of CM for more prosperous and developed working environments.

Table 5.5 Facts and figures of Central Macedonia

Indicator	Value
Size (in square km)	18.811
Population in millions (2011)	1.882.108
GDP per capita in PPS (2008)	19.400
GDP per capita in PPS (2015)	15.100
Unemployment (2010)	13,7%
Unemployment (2014)	28,7%
Unemployment (Jan-Apr 2017)	22.7%
Percentage of innovative enterprises (2010-12)	53%
Percentage of enterprises with New Product Development	13%
Percentage of enterprises which collaborate for New Product Development	13,3%
Main sectors of economic activity: Primary sector, Agriculture, Tourism, Services	
R&D expenditure in millions (€), 2013	
Indicator	Value
Business Enterprise Sector – BES & Private non-Profit – PNP	33,1
Higher Education Sector – HES	97,3
Government Sector – GOV	52,9
R&D expenditure as a percentage of GDP	0,7%

Source: Author

5.4.2 Structure, resources and specialisation of R&D

From a STI perspective, one of the key characteristics of CM is the large number of academic innovation support actions which are mainly concentrated in the city of Thessaloniki. According to Table 5.5, the R&D expenditure of the region is predominantly localised at the public higher education sector (€97.3m in 2013), in which an important number of internationally recognised institutions are found to play a significant role in the scientific community. The contribution of the government sector (both regional and national funds) is also central in funding R&D activities, reaching 52.9m in 2013. However, the CM R&D expenditure as a percentage of GDP (0.7%) remains below the EU-28 average which was approximately 2.0% in 2015. In the same vein, while the percentage of innovative enterprises for the period 2010-2012 was more than the half (53%), the industrial specialisation of the region is not well synchronised with the scientific research undertaken in academic institutions, suffering from the lack of cross-scale inter-sectoral linkages; data shows that only 13.3% of the firms which generate and diffuse different types of innovation conduct activities related to new product development.

The industrial specialisation in CM is mostly based on service sector activities, related to tourism and agro-food, which traditionally do not achieve critical investments in R&D and do not follow a science-based approach (Reid et al. 2012a); we note that firms in the private sector spent €33.1m for R&D in 2013. Rather, they require other structures of innovation diffusion such as innovation platforms, industrial clusters, business networks, science parks, innovation distributors which may be of great importance for developing innovation in local businesses. We notice, however, that while there are some of such essential infrastructures and policy initiatives in the CM innovation regime (see section C, in Table 5.5), their policy impact on innovation is still underdeveloped with limited outputs. However, no R&D clusters or business networks are existed at present to constantly promote intersectoral integration in the region. Co-location of firms with the particular objective to generate specialisation

externalities, diversification and technological spill overs are almost absent; likewise, regional networking at the level of firms for generating scale economies in innovation actions is relatively weak.

As a result, a notable contradiction has emerged in the regional innovation landscape; from the one hand, an increased critical mass of higher education, research and technology institutions is concentrated in the region, while from the other, the innovation activity and potential of the local private actors remain low and fragmented. Avranas and Nioras (2011) have shown empirically that while academic institutions seem to play a pioneering role in generating and delivering the innovation potential of the region, their linkages with the local economy remain weak. Invent here - exploit elsewhere practices are broadly found in the case of CM, where business local capacity to absorb new research outputs remains low. Consequently, research is concentrated in university laboratories, and the CM innovation system is mostly dominated by the higher education system, consisting of high-level institutes such as the Aristotle University, the University of Macedonia, the Centre for Research & Technology-Hellas.

From a physical presence, the academic community of CM holds an important representation of R&D activity in the country (Table 5.6 records 25 university faculties and 62 departments, as well as 4 research bodies with 10 research institutes); indicatively, we note that the Aristotle University of Thessaloniki is the biggest state university in Greece, while the Alexander Technological Educational Institute of Thessaloniki is the second largest technological institute. Practical information about the current STI infrastructure of the region (private and public) is presented in Table 5.6, where the most important regional players are grouped into three main categories: (a) academic institutions; (b) research centres and (c) private sector actors. The spatial concentration of research activity conducted by a large number of academic organisations creates scientifically an important added value for the region.

Table 5.6 STI infrastructure of Central Macedonia

Institution	Size/performance	Location
A. Academic Institutions		
Aristotle University of Thessaloniki	11 faculties, 23 departments	Thessaloniki
University of Macedonia	4 faculties 8 departments	Thessaloniki
International Hellenic University	3 faculties	Thessaloniki
Alexander Technological Educational Institute of Thessaloniki	5 faculties, 23 departments	Thessaloniki
Technological Educational Institute of Central Macedonia	2 faculties, 8 departments	Serres
American Farm School	STEM studies	Thessaloniki
B. Research Centres		
Centre for Research and Technology - Hellas	5 institutes	Thessaloniki
National Agricultural Research Foundation	5 institutes	Thessaloniki
South East Europe Telecommunications and Informatics Research Institute		Thessaloniki
C. Private sector (Clusters, Networks, SMEs associations, intermediaries, firm R&D hubs, incubators)		
Thessaloniki Technology Park	Business incubators, technology transfer mechanisms	Thessaloniki
Thessaloniki Science Centre & Technology Museum	STI exhibitions,	Thessaloniki
Technopolis Thessaloniki ICT Business Park	Incubator ICT	Thessaloniki
i4G Innovation for Growth Incubator	Technological incubator	Thessaloniki
Thermi Business Incubator	Start-up incubator	Thessaloniki
Alexander Innovation Zone	Innovative SMEs, incentives for R&D collaborations	Thessaloniki
Business & Cultural Development Centre	SMEs competitiveness	Thessaloniki
Industrial Zones	Industrial agglomeration	Region of Macedonia
Federation of Industries of Northern Greece	Entrepreneurial networking, R&D projects, industrial planning	Region of C. Macedonia
Chambers	Technology brokerage events, training, reports	Region of C. Macedonia

Source: Author

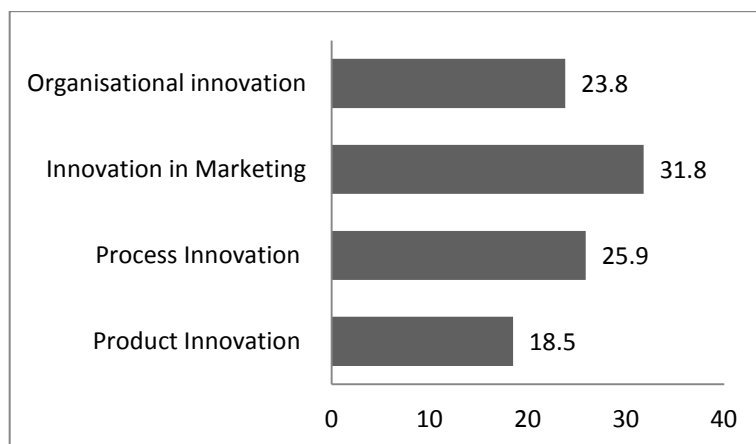
Interestingly, concerning the private sector, a notable number of local actors are found to dominate the business and innovation landscape of the region, including a science park, thematic business incubators, technology and innovation accelerators, business associations etc. Most of them are located in Thessaloniki where most of the activities take place; the Federation of Industries of Northern Greece and the chambers take a more geographically expanded role, covering different areas throughout the region. Although the existence and networking of such bodies is supportive for the local businesses to overcome diverse barriers of the region, they are still threatened by a number of challenges. As an example, we refer to an important challenge recently emerged (mostly after the 2008 financial crisis and the enforcement of the capital controls in 2015) which is the continuous trend of industrial companies mainly to immigrate to the Balkans, the so-called business run. Indeed, at a more aggregative level, there are a number of national reports which document the bulk escape of Greek SMEs in the Balkans, mostly in Bulgaria, to benefit from lower taxes and wages, access to funding and better insurance contributions. The tendency of Greek firms to transfer their headquarters or part of their business or R&D activity abroad has been currently reported by the Endeavor Greece, an international non-profit organisation which supports entrepreneurship (Endeavor 2016). This unfavourable situation is delivering negative effects on the future prosperity of the CM productive system.

5.4.3 The aftermath of a previous innovation experience

As a means to overcome the science-industry challenges, a total of 306 RTD projects (204 addressed local businesses) were approved and financed by the Regional Operational Program of the region with the aim of supporting innovation policy actions. It is argued, however, that the majority of these initiatives failed to fully achieve the desired outcomes (Reid et al. 2012a). The power and the level of engagement of diverse regional players in such policy initiatives fluctuate over time. A critical point to make is that the impact of the regional innovation strategies and

policies is not measured and assessed systematically; its evaluation is rather based on a set of baseline values and indicators which are insufficient to achieve a solid understanding of the medium and long-term effects of the policies; it is reasonable to assume that, simply measuring the No. of scientific publications, patent applications; start-ups, spin-offs etc is definitely the one side of the coin. What also seems to be crucial though is a thorough examination of the demand side, where an analytical approach would measure empirically how and to what extent a set of output indicators are connected with local demand. Previously, the development of various regional STI policies in CM was mainly initiated in 1995 by the introduction of innovation planning actions such as the Regional Technology Plan (RTP), followed by the Innovative Actions Programme, the Regional Innovation Pole etc. In fact, such programs were the first concerted effort of the regional policymakers to address the local RTDI system and understand the innovation ecosystem of CM in a more analytical way. In the context of these innovation support programs, a number of critical actions were launched with the objective of generating critical mass, particularly in the industrial sector, and creating strong linkages with the public research community. It is argued that the most important impact of these programs was the promotion of a more systemic innovation-based cooperation between academic and business actors (Komninos 2013). However, despite these improvements, the industry-academia gap contains a number of obstacles for generating technological innovation in the business sector. Innovation in the business sector is mainly generated by organisational and marketing interventions. As Figure 5.4 shows innovation in marketing and process innovation were the most prevalent among the four types.

Figure 5.4 Percentage (%) of types of innovation in Central Macedonia (2010-12)



Source: Data collocated by EKT (2015a)

As far as productivity is concerned, the industrial sector CM used to pose a higher average productivity than the rest productive activities of the region (Region of CM 2015). However, it still lacks critical mass in R&D infrastructures and suffers from the lack of effective innovation relay mechanisms such as technology transfer structures, innovation intermediaries and accelerators etc, which could bring closer local companies with R&D infrastructures for developing joint innovative actions. Statistically, this can partly explain why innovation in new product development holds the lower percentages (13,4%) in the private sector of the region (see Table 5.5).

5.4.4 Innovation conditions and ecosystems

The regional innovation system of CM seems to have many similarities and knowledge attributes with the Cretan one. One of its main characteristics is the continuous domination of the local scientific community (compared to the private sector), which concentrates high quality of indigenous research infrastructures with an international potential. In this respect, public research organisations play a central role in formulating the research agenda of the region, while companies and other private bodies play a rather minor role in shaping or even following the research regime of the

region. In fact, public knowledge creators have become the main players in the CM technology innovation system. Local academia consists of public research centres, located mainly in Thessaloniki, and various educational institutes dispersed throughout the region with strong knowledge-based capital. Through these permanent infrastructures, multiple sources of knowledge and creativity are generated in various scientific fields, affecting the innovation capacity and potential of CM sub-system.

In fact, the region possesses an important number of high-quality R&D facilities which support the development of basic research that is not ultimately applied in the industrial sector. Indeed, while academic research is a major determinant of the local R&D landscape of the region, it seems disconnected with the local economy (Reid et al. 2012a) and, apart from a few exceptions, it appears far away from the ongoing needs of the local industrial sectors. Traditionally, academic activity was not typically oriented towards cooperation with the local enterprise sector, and therefore, it is not found to have a particularly active and continuous role in the local value chain. Undoubtedly, local universities and research centres generate high-level scientific knowledge, providing the region with a significant multidisciplinary knowledge base. What is still vague is the relevance of such academic knowledge in developing new innovation dynamics within the local business economy, highlighting an innovation generation-adoption gap. In this respect, the industry-academia linkages remain relatively weak, yet important, highlighting the need to strengthen further policy initiatives related to commercialisation processes and IPR strategies, particularly in multidisciplinary areas where development costs are usually higher. For example, in our research, we have not identified any comprehensive IPR strategy neither at public bodies (e.g. universities) nor at private firms, appropriate to effectively protect and manage organisations' intellectual capital. The science-industry disconnection, however, tends to affect drastically the creation of knowledge spill overs which, in their turn, promote the economic resilience of the region and increase its competitive position.

More precisely, regarding the competitiveness of CM recent data from the 2016 European Regional Competitiveness Index (RCI), shows that the region remains at low levels, as it is ranked 242nd out of 263 EU regions. Shifting focus from strict socioeconomic indicators to more innovation related factors, the RCI 2016 points out that the region is found in the bottom of the ranking list in most of the indicators (see Table 5.7), with the exception of business sophistication where CM is performing above the EU average.

Table 5.7 Competitiveness of Central Macedonia: ranking and scores

	Rank	Score (0-100)
Competitiveness	242/263	11.7
Innovation dimension	214/263	25.6
Technological redness	243/263	26.1
Infrastructure	203/263	13.4
Business Sophistication	150/263	32.9

Source: Elaborated data from RCI (2016)

5.4.5 Regional collaborations and networking

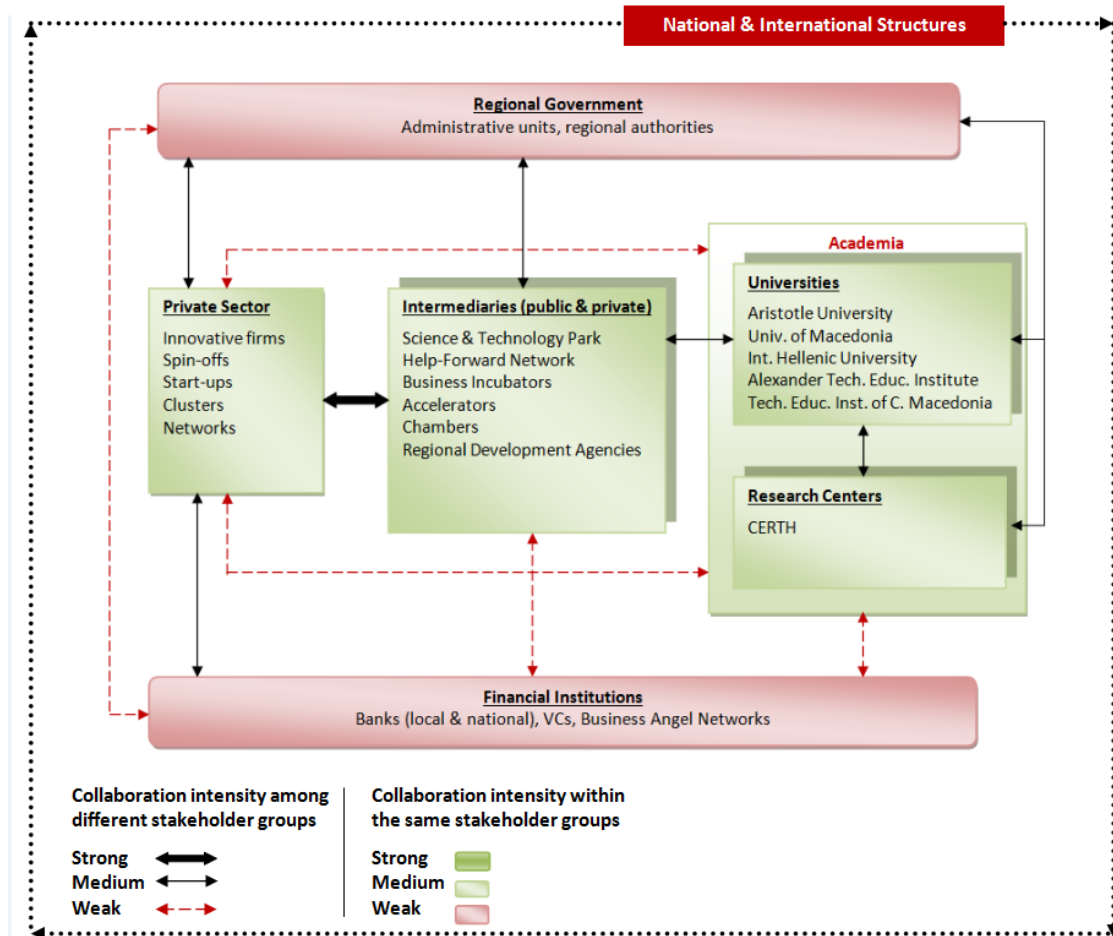
Concerning regional networking and business partnering, synergies and networks are more conspicuous in non-R&D intensive industries, in which traditional local firms seek to benefit from economies of scale; for example there is a large number of active tourism and agriculture associations, commercial chains etc, including both smaller and larger firms. The lack of strong knowledge private-public synergies as illustrated in Figure 5.5 is partly caused by the fact that the majority of the local firms are family-owned businesses with limited technological sophistication. Characteristically, these firms have a low-tech profile and significantly low capacity to absorb new knowledge and succeed in innovations by exploiting new knowledge dynamics and innovative technologies. They have also been affected dramatically by the financial crisis, which has almost urged industrial players to exclude any large-scale R&D project from their medium and long-term operational planning. Moreover, as

regards to this relatively new challenge, we have performed interviews with local entrepreneurs from the CM business sector, and we have documented their financial difficulty to allocate private money for innovation and R&D investments (note: recent Regional Innovation Scoreboard data shows a clear decline in Gross domestic expenditure on R&D in the business sector in the decade 2007-2017, see Table 5.8). More precisely, in the question if they would invest in R&D infrastructures for gaining a potential added value, almost all of them responded negatively, due to the uneven consequences of the unstable macroeconomic environment. As a result, an emerging attribute of the new financial situation is that these firms are not usually able to create and retain their own R&D capacities and, above all, they do not seem capable to make use of the existing R&D infrastructures provided by the scientific community of the region. Clearly, this is an increasingly emerging challenge which currently is distributed rapidly throughout the region. An important exception is the case of an increasing number of new high-tech companies and spin-offs, mainly from the ICT sector, which appear more capable to adopt cross-sectoral approaches to set inter-disciplinary R&D synergies. In this case, diverse local players are part of a collective system of knowledge with important knowledge spill overs. The process of knowledge exchange between academia and this kind of firms is treated as an extremely critical resource for the innovation enhancement of the business community, as empirically demonstrated by recent studies in other regional environments, see for example (Todtling, Asheim, and Boschma 2013). Most of these companies are located around the greater area of Thessaloniki and possess a combination of advanced scientific and entrepreneurial knowledge created by constant R&D efforts and investments.

From a financial perspective, the CM innovation system is largely based on public investments, without following a market-oriented approach. The financial sector and its investment policies over the last 20 years have not been very supportive for generating innovation-driven growth. The lack of venture capitals and other financial mechanisms both at the national and sub-national level acted as a prohibiting factor for

technology and innovation investments; this weakness has been offset by the allocation of public funds. The absence of important sources of private and public funding, however, acts as a prohibited factor towards setting up interactivity between industry and academia for developing joint innovative actions. To some extent, this also impedes knowledge flow and diffusion of technological innovations; for knowledge-intensive companies this is usually translated into problems of accessing and managing technical knowledge (in a more engineering sense), while for firms operating in more traditional sectors, knowledge takes a more organisational form (e.g. how to organise better business functions such as sales and marketing, enrich accounting with ICT applications etc). On the other hand, the existence of diverse intermediaries in the CM innovation is absolutely an important advantage of the innovation system of the region (see Figure 5.5), which however needs further modernisation to gain a systemic presence in the productive system and get embedded in the academic community. Institutional intermediaries, however, (e.g. industry associations) are seen as an important factor for shaping economic development (Watkins et al. 2015; Papaioannou et al. 2018). Currently, the business and innovation intermediary service system of CM consists of four main kinds of official bodies including the science park, the innovation zone, a number of business incubators, innovation accelerators, business networks etc. We have performed interviews with four experts from such organisations and we have recognised a clear strategic approach of supporting the creation of spin-offs and university start-ups in the region, although legislation and regulatory framework are still adverse at the sub-national level (e.g. regional power to introduce favourable tax regimes)

Figure 5.5 The regional Innovation system of CM: linkages and knowledge diffusion



Note for research centres: The regional unit of the Institute of Geology and Mineral Exploration is also located in the city of Thessaloniki

Source: Author

From a general point of view, the innovation system of CM is dominated by the existence of diverse players with different institutional roles, configurations and capabilities for innovation. The interactions among these actors and their linkages with other players outside the region (national and international) determine the way CM RIS develops and evolves over time. In this respect, the innovation regime of the region is context-dependent on the institutional setup of the local ecosystem.

5.4.6 Groups of regional actors and interrelation among them

Generally speaking, there are four kinds of institutional actors which play a key role in generating, delivering and assimilating innovation and new knowledge within and outside the region. The first group (illustrated on the top of Figure 5.5) refers to a number of policymakers, consisted of regional public organisations and other government institutes responsible for innovation policy and regional development (e.g. public agencies, developmental units etc). While most of these bodies are closely connected to each other, at times, they are characterised by elements of discontinuity resulted by their limited power and autonomy inherently developed over years (e.g. inertia due to institutional constraints, communication uncertainty and delays in decision-making due to bureaucracy, etc). During the period of the Greek financial crisis (from 2008 up to now), an important number of governmental organisations have been experienced significant institutional and political changes due to the difficulties imposed by the fiscal consolidation (e.g. cut of resources, merger activities understaffing due to layoffs and hiring freezes etc). This challenge has affected the performance of these organisations.

The second group of actors, named academia, includes technology and knowledge creators (mainly universities and research bodies) which conduct basic and applied research in various S&T fields. By tradition, they take a pioneering role in formulating the variety of scientific knowledge in the region, providing diverse localised learning patterns. The collaboration among these types of organisations is usually related with the development of joint R&D projects within and outside the region; occasionally, the more active players of this group may also stimulate the creation of inter-sectoral partnerships to support the development of activities undertaken among different organisations. The remaining two groups constitute the business enterprise sector (firms and other business-oriented entities including funding bodies) and a number of private and public organisations which play an intermediate role through their supportive services for generating innovative actions. Regarding the intensity and

type of firms' innovation, knowledge-intensive companies and businesses with advanced technological capabilities are more likely to develop product and process innovation. On the other hand, innovations for more traditional or smaller family-owned firms are usually related with marketing and other organisational functions. In this respect, the innovativeness of a firm (level, intensity and type) is conditioned to its business traits developed over years (understanding of technology, capacity to access learning, ability to collaborate etc). As regards to funding, innovation is not financed regularly. The possibility to getting non-state funding for RTDI investments from financial institutions such as banks, business angels etc, is extremely limited, particularly after the first effects of the economic crisis. In fact, banks and other financial organisations provide an extremely limited number of funding for supporting innovation and business development. The interviews we have conducted with the business community of CM come up with a strong common finding: from 2009 onwards, most of the financial institutions do not finance innovation.

Institutionally, there are no clear patterns to explain how decision-making, implementation and supervision of S&TI is taking place within and particularly among these different groups of local stakeholders. In this respect, we argue that at present there is no systemic understanding of the RIS of CM. The lack of sophisticated indicators (both qualitative and quantitative) at the regional level (e.g. to measure the proportion of start-ups and new spin-offs per industry, assess business failure/success per sectors of economy, identify patenting trends per type of firm and sector of activity, map the distribution of different types of innovation per sector etc) is also a prohibited factor in understanding and analysing the micro-dynamics of the RIS. Without the introduction of such practical indicators a totally clear and consistent picture is difficult to get for the region. For instance, since inter-sectoral collaboration does not happen automatically or naturally, we cannot actually say with confidence how or in which specific areas inter-firm and inter-organisational learning takes an interactive and collective form. At the level of firms, the interviews indicate that in

innovative companies, technological learning is diffused through R&D projects, characterised by sector-specific patterns (e.g. the case of the ICT sector where firms exchange sets of knowledge through technological collaborations). In other forms of businesses, perhaps in more traditional sectors, technology learning and knowledge spill overs are normally embedded in customer-supplier relationships. However, to better understand the institutional functioning of the regional ecosystem of CM (this also applies in the case of Crete), we possibly need to analyse the micro-systems of innovation from a more aggregative perspective which will follow both qualitative and quantitative approaches.

5.5 University-industry inefficiencies at the sub-national level: an overview

During the last years, both regions have made notable efforts to change their RTDI policies with the objective of focusing more on how to better increase public-private RTDI initiatives instead of investing in public infrastructures. However, in practice, little has been achieved to bridge successfully the industry-academia gap for a number of place-specific reasons. First, the absence of mutual need for constant collaboration appeared to play a central role. In reality, as companies and academic institutions used to be able to get access to public funding, the need to set industrial and academic collaborations remained at very low levels for many years. Second, the lack of trust-based relationships between academic institutions and businesses due to the lack of reliability, readiness and validity from both sides, can also explain the reluctance for building institutional collaboration. In this respect, institutional dynamics are strongly shaped by endogenous powerful interests and external old-fashioned legislation. Research centres and universities particularly, suffer from organisational and managerial long-standing pathogeneses, (for example various types of limitations emerging from the academic asylum, over-powerful student associations etc). Companies' low absorptive capacity is seen as a third obstacle that makes industry-academia collaborations problematic. In fact, the strong academic and research

community from the one, and the weak innovative entrepreneurship of the industrial sector from the other, leads to mismatching between mature research outcomes and local market needs. In practice, universities and research centres are crucially closed to businesses. Research centres and particularly universities are not extroverted; internal institutional environments, anachronistic rules and bureaucracy act as prohibiting factors. It is clear that getting access to funding is probably the most important reason, if not the only one, that local academia looks occasionally for business partnerships. This problem increases notably due to the lack of permanent institutional translators that would facilitate both sides understand, communicate and cooperate with each other. In fact, the academic community in lacks proper liaison mechanisms and commercialisation channels, and therefore, the exploitation of research outcomes is not conducted consistently and repeatedly, while the commercialisation process takes place at an ad-hoc basis.

5.6 Innovation and R&D trends in Crete and CM: what data says

From a general point of view, we could argue that the regional innovation systems of Crete and CM are of roughly equal weight and importance of the regional innovation structure of Greece. Based on the analysis of the Regional Innovation Scoreboard which assesses how European regions perform with regard to innovation, Table 5.8 brings together basic innovation and R&D data for the greater areas of Crete and CM, and provides a comparable overview for the decade 2007-17. The table summarises data for two groups of regions as categorised by the EU Regional Innovation Scoreboard: (A) South Greece which contains three administrative regions: Central Macedonia, Western Macedonia and Eastern Macedonia and Thrace; and (B) Crete and Aegean islands which cover the region of Crete, the region of North Aegean and the region of South Aegean.

Table 5.8 Innovation and R&D data: a comparison between the two regions

Indicators	(A)					(B)				
	Southern Greece					Crete & Aegean islands				
	2007	2009	2011	2016	2017	2007	2009	2011	2016	2017
GERD	0.28	0.32	0.32	0.23	0.50	0.39	0.41	0.40	0.40	0.73
BERD	0.15	0.10	0.19	0.12	0.11	0.09	0.04	0.16	0.08	0.06
Intensity of SMEs' innovation	0.35	0.28	0.34	0.43	0.50	0.36	0.27	0.36	0.58	0.56
Intensity of SMEs' collaboration	0.12	0.25	0.12	0.42	0.43	0.14	0.23	0.14	0.23	0.66
EPO Patents	0.23	0.24	0.28	0.13	0.13	0.21	0.21	0.26	0.15	0.15
Intensity of SMEs' employment	0.13	0.14	0.14	0.14	n/a	0.06	0.14	0.16	0.12	n/a
Innovation sales	0.35	0.50	0.42	0.30	0.41	0.36	0.52	0.44	0.28	0.49
Population with tertiary education	0.48	0.50	0.52	0.56	0.59	0.40	0.41	0.38	0.40	0.45

Source: combined data from RIS 2007, 2009, 2011, 2016, 2017

Notes:

¹ Normalised data (The maximum normalised score is equal to 1 and the minimum normalised score is equal to 0)

² GERD: Gross domestic expenditure on R&D includes expenditure on research and development by business enterprises, higher education institutions, as well as government and private non-profit organisations

³ BERD: Business enterprise R&D expenditure

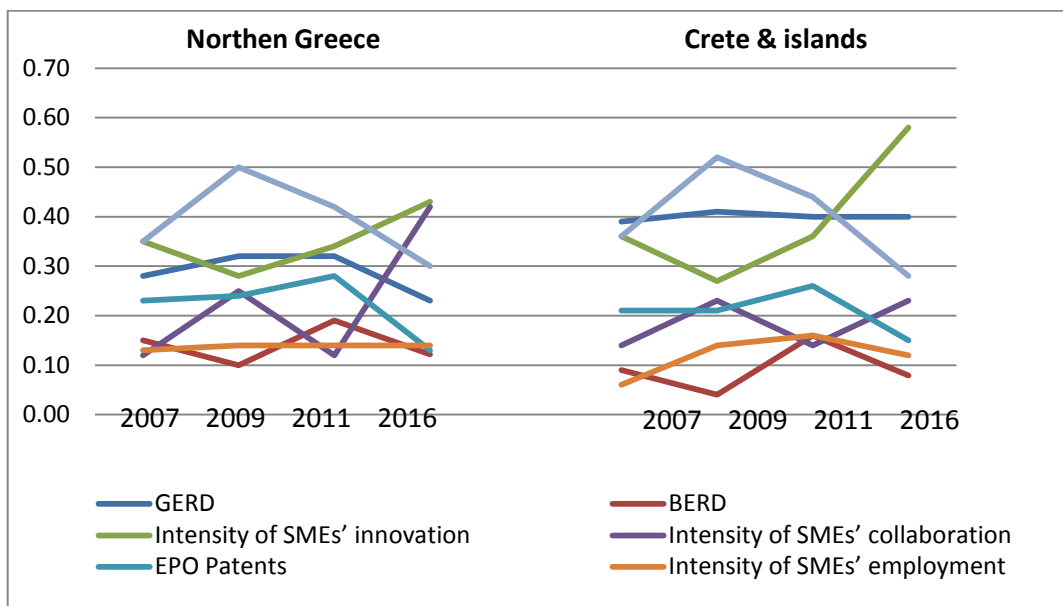
⁴ 2017 data refers exclusively to C. Macedonia and Crete respectively

⁵ Regional data availability for Greece: 2008-16: 47.3% and 2016: 88.5%

In general, the analysis of Table 5.8 shows that the two groups of regions in which Crete and CM belong to, represent a relatively similar innovation and R&D performance without any notable difference. For example, if we compare the average of the first two indicators (GERD and BERD) in the period 2007-2017, we see that the private and public R&D expenditures of the regions range roughly on the same levels (S. Greece: 0.33 and Crete & Aegean islands: 0.46). Similarly, data on the Gross domestic expenditure on R&D in the business sector, suggest a decline tendency occurring in both regional environments from 2011 onwards. This decrease is probably linked with the difficulty of the business sector to allocate financial resources for innovation-related investments, as previously discussed.

A relatively small but noteworthy difference between the two regions may be observed particularly in the period 2011-2016 for the intensity of SMEs' collaboration (where S. Greece performs better during the last years), as well as for the intensity of SMEs' innovation indicator (where Crete & the Aegean islands show a better performance), see Figure 5.6.

Figure 5.6 Innovation and R&D in Crete and Central Macedonia (2007-2016)



Source: Based on RIS 2007, 2009, 2011, 2016

Moreover, the figure illustrates regional performance for seven of the above innovation and R&D indicators during the period 2007-2016. Interestingly, the results show a mixed picture for the two regions, with only two of the indicators (intensity of SMEs' collaboration and intensity of SMEs' innovation) to demonstrate some difference as discussed above. The remaining ones illustrate either a slight fluctuation or a notable decline mainly from 2009, where the first effects of the economic crisis have been profoundly seen.

Overall, we can argue that there is no fundamental divergence between the two regional innovation ecosystems, in the sense that they represent a relatively similar innovation, R&D and business performance. However, this does not automatically mean that there are no path-dependent attributes or place-based organisational routines suitable to diversify the way these two ecosystems develop and evolve over time. As an example, we refer to the innovation performance of the private sector, that traditionally remains at quite similar levels for the two regions; what is different though is the type of innovation (e.g. product or process innovation, marketing or organisational innovation etc), the type of sectors and industries in which innovation is usually generated and diffused (e.g. trade-shipping in the case of Crete, textiles and clothing in the case of CM), and the proportion and contribution of diverse local actors in creating innovation and new path development (e.g. number of academic centres and their linkages with the local society, types of intermediary organisations and level of support etc). Clearly, one possible way to better understand the institutional functioning of the regional ecosystems of Crete and CM is to analyse the micro-systems of innovation from a more aggregative perspective including both qualitative and quantitative approaches. Currently, what is missing is a systematic exploration of the quantitative approach due to the lack of proper indicators at the sub-national level.

Chapter 6: The design and implementation of smart specialisation strategies in Crete and Central Macedonia

6.1 Introduction

Chapter 6 aims to answer the first Research Question (RQ) of this thesis "*In what ways did the selected Greek regions develop smart specialisation strategies*", by investigating how S3 was designed and implemented in Crete and CM. Empirical evidence is collected and analysed from both regional environments with the objective of conducting a first systematic attempt to describe the processes of developing S3 in the two regions, highlighting both theoretical considerations (from the design phase) and practical aspects (from the implementation phase).

As discussed in the literature review chapter, many aspects of the S3 implementation require additional empirical evidence and clarification to provide a better understanding of how S3 could be realised in the regional setting. Surprisingly, while there are plenty of supportive documents, aimed at providing administrative and practical guidance at the EU, national and sub-national level, the realisation of S3 cannot be taken for granted at present, given that there is no optimal way of institutionalising and governing its implementation. Quite the opposite, EU regions seem to follow their own approaches according to a place-specific understanding of what smart specialisation is and how it can be addressed in practice. Besides, we know from the recent S3 literature that regions with different development features and innovation potential may need to develop different methodological approaches to implement S3, depending on their capacity to stimulate, govern and regulate regional development; see for example (OECD 2013; Gianelle et al. 2014; Sörvik et al. 2016; McCann, van Oort, and Goddard 2016; Marques and Morgan 2018). In this regard, the implementation of S3 is by no means a straightforward process that could be simply

copied and applied at different regional milieus and, as such, it would be crucial to study diverse regional cases throughout Europe to inform S3 policy making and action.

Considering the needs of this new policy framework, one could argue that the more evidence we can gather, the more confident we can be regarding how S3 implementation can be better understood. In chapter 6 we acknowledge this priority view and we examine a series of critical elements associated to the design and implementation of S3. To meet this objective analytically, a number of sub-questions are formulated and examined empirically for Crete and CM: *What particular actions have been carried out by Crete and CM to design and implement S3? Are there any significant methodological differences between the two regions? What policy tools and resources have been exploited? What practical barriers have been emerged, and which of them have been effectively encountered? Are there any policy lessons to be learned from the Cretan and CM cases?* Most of these sub-questions are descriptive in nature and follow an in-depth narrative approach.

The value of chapter 6 is based on two key elements. The first is that it builds a thorough understanding of S3 practices, provided for the first time in the Greek regional context. Apart from a limited number of conventional studies, official presentations and oral speeches, no systematic data is available to describe in depth how S3 has been addressed in the Greek periphery. An exception is the recent work of Marques and Morgan (2018), who explore S3 practices in Eastern Macedonia and Thrace. Additionally, there are no analytical studies, especially focused on the particularities of the Greek Science Technology and Innovation (STI) landscape appropriate to assist the work of local policymakers in the S3 context. What we know so far about smart specialisation is mostly focused on evidence and work conducted beyond the borders of Greece (see literature review chapter, section: *what current empirical evidence says*). Second, by describing the procedures followed by Crete and CM to develop S3, chapter 6 suggests a basis to investigate other important elements

addressed in the ongoing S3 literature (e.g. governance and institutional settings analysed in chapter 7 and capacity building examined in chapter 8).

During fieldwork, we found that Greek S3 are conducted both at the national and sub-national level (regional). At the national level, S3 is carried out as an adjunct to regional strategies that constitute the basis of the new programming period. Thus, to build the smart specialisation narrative, chapter 6 falls into two main parts: *the national context* (Part A) which describes the national situation briefly; and the *regional context* (Part B), which discusses in detail the S3 situation for Crete and CM separately. To perform the analysis and investigate S3 practices analytically for the two regions, two main categories were created in NVivo (one for each region), with a number of sub-categories. In total, as presented throughout the chapter, we generated 325 code references from which 34 single quotes (19 for Crete and 15 for CM) were used to evidence our findings.

6.2 PART A: national context - a brief overview

As already discussed in the introduction, in the case of Greece, smart specialisation strategies are not only conducted at the regional but also at the national level. Given that regional and national S3 plans are strongly connected with each other (GSRT, 2012), it is essential to examine both levels. In this section we provide a brief discussion on the national level. We present what smart specialisation domains have been identified and selected, and examine what particular policy tools are used to support the development of national strategies in the context of S3.

6.2.1 Priorities of the national smart specialisation strategy

The formation of the general strategic framework for national smart specialisation was initiated in 2010 under the supervision of the General Secretariat of Research and Technology (GSRT), which is responsible for the national policy for Research, Technological Development and Innovation (RTD&I) in Greece. An official

approval of the national strategy came five years later (August 2015). A series of consultation procedures conducted during this 5-year period, as well as the analysis of previous economic and technological specialisation studies prioritise eight key R&D domains (GSRT 2012), referred as Sectoral Priorities of the National Strategy, for the implementation of the national smart specialisation strategy (see Table 6.1). A detailed description and explanation of each selected priority area is given in the official S3 document, titled: *National Research and Innovation Strategy for Smart Specialisation 2014-2020*⁶.

Table 6.1 Priorities of the national smart specialisation strategy

<ul style="list-style-type: none">▪ Agro-food▪ Health - medicines▪ ICT▪ Energy▪ Environment and sustainable development▪ Transport▪ Materials - construction▪ Tourism/Culture - Creative industries
--

Source: Author

It is argued that the national smart specialisation priorities have been identified in sectors and technologies in which the country has shown a competitive advantage (Reid et al. 2012b). Interestingly, as discussed in the coming sections of Part B, many of the selected national domains are also included in the regional S3 action plans of Crete and CM, promoting regional-national connectivity and interaction. Specifically, agro-

⁶ Available at:

<http://www.gsrt.gr/central.aspx?slid=12014661139616461496396&olID=824&neID=824&neTa=92&ncID=0&neHC=0&tbid=0&lrID=2&oldUIID=a18241011201466113961012&actionID=load>

food, ICT, energy/environment and tourism/culture are some of the main R&D domains which have also been selected by both regions.

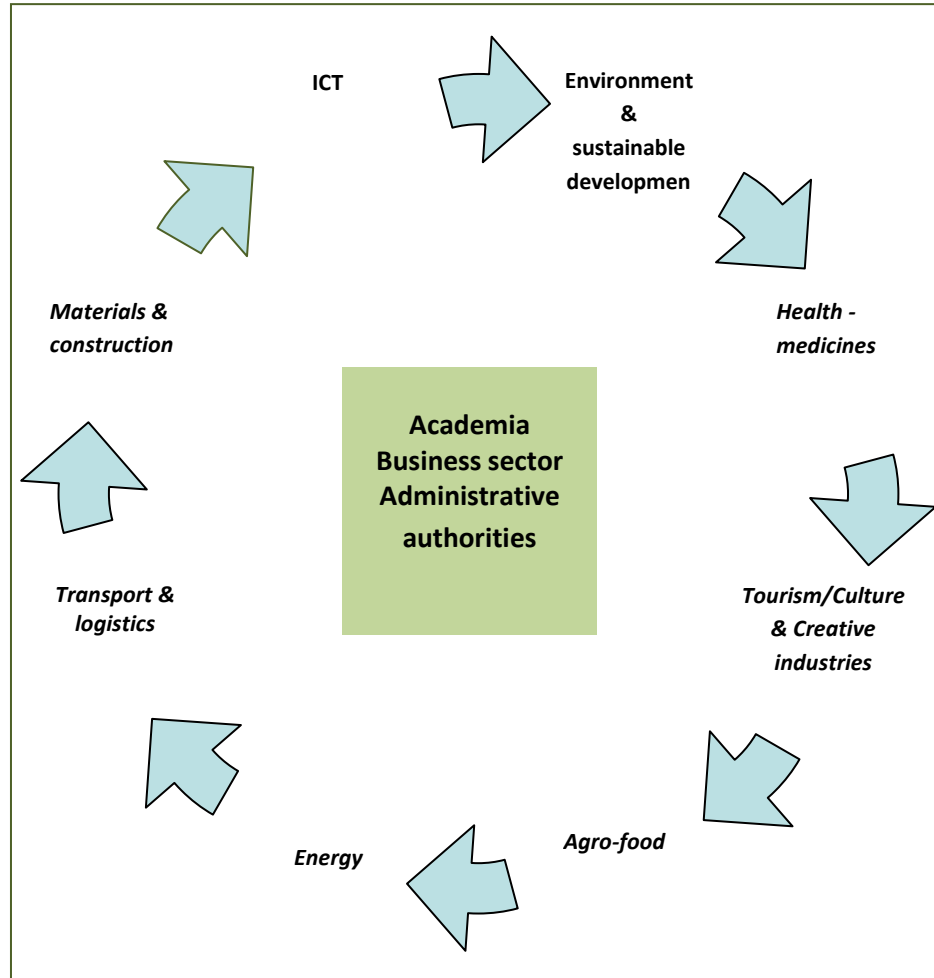
6.2.2 Policy tools for developing national S3

To facilitate the design and implementation of S3 and particularly of the entrepreneurial discovery as an ongoing and dynamic process, three main policy instruments were employed and used at the national level: *innovation platforms*, *foresight* and *benchmarking* (GSRT 2012). These three instruments constitute the national S3 innovation policy toolkit which is used to identify key priorities for future areas of specialisation.

6.2.2.1 National innovation platforms

The creation of eight open innovation platforms (one for each selected domain) has been used as a central strategic tool to support institutional networking and facilitate public consultation during the development of S3 (see Figure 6.1). Innovation platforms are seen by the national S3 co-ordinators as a means of concentrating the interest of different stakeholder groups at both a national and sub-national level, as it is the main official tool for the consultation process (GSRT 2012).

Figure 6.1 Schematic illustration of the national innovation platforms



Source: Author

Through the development and exploitation of this new platform initiative, the national government aimed at creating a favourable collaborative environment for national and regional players, as well as, at avoiding duplication among the central and regional action plans. The importance of building and functioning innovation platforms within the S3 framework is stressed in the following quote provided by a Cretan respondent with a key role in the co-ordination of S3:

Innovation platforms seems to be a useful tool for smart specialisation as it can facilitate the communication among different local actors and contribute to the identification of S3 specialisations (DACr44, 2017)

In this respect, the innovation platforms not only constitute an important tool for regional-national networking but also a basic policy instrument to be used during the entrepreneurial discovery.

6.2.2.2 Foresight

The exercise of foresight has been also introduced as a complementary strategic tool to facilitate the entrepreneurial discovery. According to the mainstream, documented in the strategic document prepared and published by the GSRT (2012), the method of national foresight was not used to simply predict the future, but to stimulate a creative and participatory process in which new entrepreneurial opportunities could be identified and selected. The main role of foresight in this dynamic process was to help national policymakers and strategists identify continuities and discontinuities in both national and sub-national developmental paths. Foresight was scheduled to run in parallel with the prioritisation process and being repeated several times during its realisation.

6.2.2.3 Benchmarking

In the Greek S3 framework, the process of benchmarking is used to perform comparisons in two different ways: among entrepreneurial actors (e.g. compare their performance and ability to respond to S3 challenges) and among projects, programmes and policies implemented within the S3 framework (e.g. compare outcomes across different S3 projects), with the objective of identifying gaps and opportunities. In this respect, GSRT (2012) argues that benchmarking can serve as a crucial tool for highlighting good S3 practices which could be used to understand better the role that

different entrepreneurial actors (firms, academic-research community, governmental bodies etc) should take in different S3 stages.

6.3 PART B: regional context

In general, the governance of S3 at the sub-national level is carried out by the regional councils of the thirteen Greek regions, pursuing the development of a cross-regional governance structure. Each region is responsible to design and develop its own S3 framework, with the support of its Regional Scientific Council for Research and Innovation which is at present the official tool of each region to support innovation and boost regional development. Part B investigates smart specialisation strategies at the regional level, focusing particularly on Crete and CM. It seeks to understand what particular actions have been conducted to start the design and then the implementation of S3, what policy tools and resources have been used, and what challenges and barriers have been emerged during the smart specialisation process.

From a general perspective, our findings suggest that the regional context highlights different views as to how smart specialisation was initially understood and adopted by the regional communities of Crete and CM. For example, the analysis indicates that, in the beginning, there was no common understanding of the smart specialisation notion and particularly of its practical realisation as an innovation policy tool. We present three indicative quotes collected by interviewees from both regions, which show that the smart specialisation framework was vague and unclear, revealing a relatively weak understanding of its concept:

At the beginning, our understanding around smart specialisation was very limited (ANCr11, 2015)

What is smart specialisation, what is the entrepreneurial process of discovery and most importantly how this new approach can be realised in the Greek periphery; we are not given any clear methodological

directions as to how it can be applied, not sure at all how to proceed with it (SOCM37, 2015)

Is there any particular institutional framework for developing smart specialisation strategies? Should smart specialisation strategies be developed at a national, regional or both levels? Who can tell us? (XACM39, 2016)

On the other hand, other interview perceptions indicate smart specialisation as a new strategic tool, suitable to overcome previous policy inefficiencies and fight the deep-rooted vulnerabilities of the Greek financial crisis. Indicative quotes follow:

My personal opinion is that smart specialisation can correct mistakes from the past, it can help revising public policy interventions which were not really successful in the past. Smart specialisation is an innovation policy tool which supports regions trigger change and boost development in a rational way, and we need an effective governance model to support smart specialisation, which is currently missing from our region (PECM26, 2015)

Smart specialisation helps regions identify themselves, understand who they are and what they can or can't do. It's a tool to see how to make sense of their own assets and trigger regional development (KYCM23, 2015)

The main idea of this view is that smart specialisation is seen as a regional strategic tool which is appropriate to progressively build the innovation potential of the regions and improve regional economic performance. Given the relatively weak understanding of the smart specialisation notion (at least in the beginning) on the one, and its emerging meaning as a regional strategic tool on the other, it is increasingly important to analyse the way S3 was adopted and addressed in the selected regions.

REGION OF CRETE

6.4 Smart specialisation practices in the region of Crete

6.4.1 S3 overview, entrepreneurial discovery and priority areas of Crete

The first initiatives of smart specialisation were launched by the Managing Authority⁷ (MA) of the region of Crete in 2012, and took a structured shape at the end of the same year when an informal smart specialisation working group was set up and approved by the regional governor to initiate S3 (see following sections for details). This was the first official reaction of the political authorities at the sub-national level to fulfil the EU *ex-ante* conditionality and become eligible to get access to the 2014-20 European funding. The interview responses tend to show off that Crete seemed to be one of first regions in the country which incorporated the logic of smart specialisation and adopted its policy principles in the regional context. They also point out that S3 was accepted by the local political system as an appealing policy to tackle the negative effects of the financial crisis and improve island's employment and productivity rates. In respect to the early outset of the S3 practices, a member of the Cretan S3 working group says:

We began smart specialisation in the middle of 2012, and I believe we were the first Greek region which introduced its logic in the regional setting (KACr12, 2015)

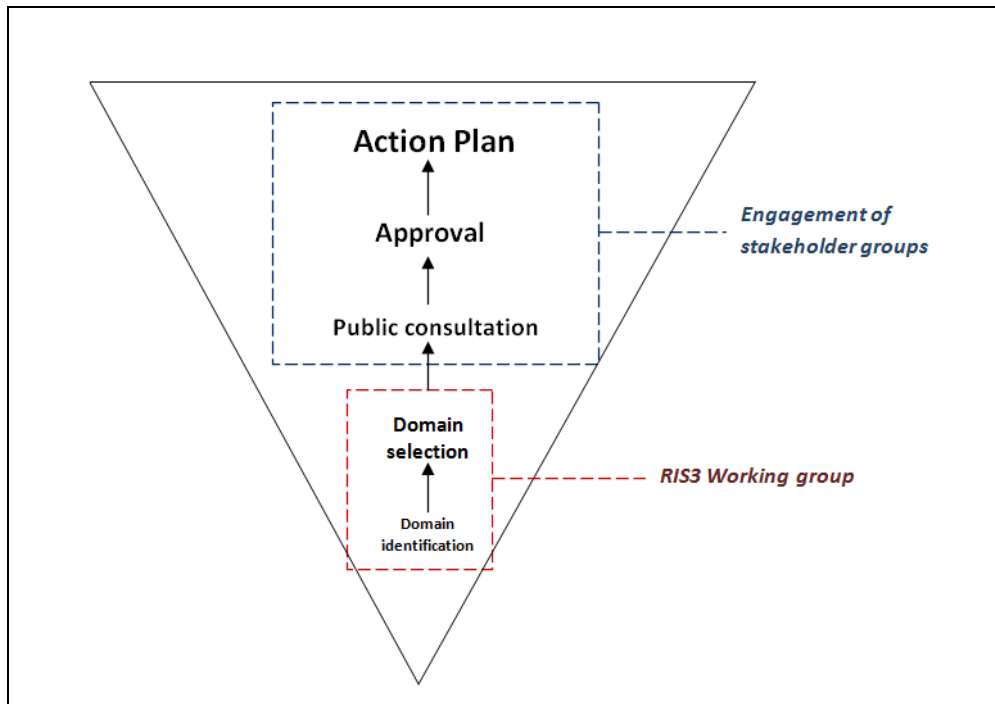
A number of similar views (16 out of 30 respondents) suggest that Crete was found to play a groundbreaking role in the development of the Greek smart specialisation strategies, as being probably the first region which addressed S3 challenges, prior to larger regions such as Attica (Athens) and CM, whose smart specialisation planning started from 2013 onwards.

⁷ The Managing Authority is responsible for the Regional Operational Programmes implemented within the National Strategic Reference Frameworks

6.4.1.1 The entrepreneurial discovery in the region of Crete

Cretan policymakers followed a place-specific policy approach to commence and develop the entrepreneurial discovery in the region. Our responses indicate a rather narrow-to-broad approach with five main stages as illustrated in Figure 6.2. The outcome of the first two stages (*domain selection* and *domain identification*) was influenced by specific (narrow) attributes and closed practices (in the sense of limited stakeholders' participation). These two stages put the basis for initiating the early stages of the design of S3. The other three stages (public consultation, approval and action plan), were the outcome of a broader involvement of the local entrepreneurial actors which was based on the contribution of the different productive structures of the island.

Figure 6.2 Cretan entrepreneurial discovery: A narrow-to-broad approach



Source: Author

The identification and prioritisation of S3 was initiated by a group of S3 experts (RIS3 working group) which, as discussed later in detail, it was in charge to make proposals and recommendations to the regional governor regarding the domains to be selected for future specialisations. As illustrated in Figure 6.2, in these two first stages, a broad-based engagement of the local community was restricted. The main idea of keeping this approach narrow, was to speed up all necessary preparatory actions for the detection and selection of the main S3 domains with the ultimate objective to get approved and proceed with the identification of specific specialisations within these domains. Once S3 priorities were approved at an official level (by the regional, national and EU authorities), a series of public consultations were conducted to inform local society about the selected domains and start an open and continuous dialogue with the academic and business community of the island for the collection of ideas, proposals and suggestions. Representing a common perception, a Cretan S3 expert points out the process of consultation was extensive and repetitive:

The region of Crete has had a long period of consultation, several events were organised, 2 or 3 informative workshops in which formal presentations were given. A number of organisations were invited to participate and the S3 document was sent in advance for better preparation (SACr1, 2014)

Beyond any obvious reason (e.g. inform stakeholders, get public's input, stimulate public involvement etc), public consultations were seen as means of legitimising the decision making and, therefore, minimising the possibility for accusing policy options in the future. In general, the S3 co-ordinators expressed satisfaction on the final outcome of the consultation; this view is briefly presented by a member of the S3 working group who says:

We didn't receive any negative feedback from our presentations to the general public. We didn't experience any disagreements for the selection of the specific R&D domains (ANCr11, 2015)

A clear indication comes out from the above citation, suggesting that the consultations did not raise any significant disagreements on the selected domains, and therefore led to formal approvals (at the level of EU) and allowed the preparation of the first S3 action plans.

6.4.1.2 Priority areas in Crete

The Cretan smart specialisation strategy identifies four priority domains (as well as the use of ICT for horizontal application) as illustrated in Table 6.2.

Table 6.2 Priorities of the smart specialisation strategy in Crete

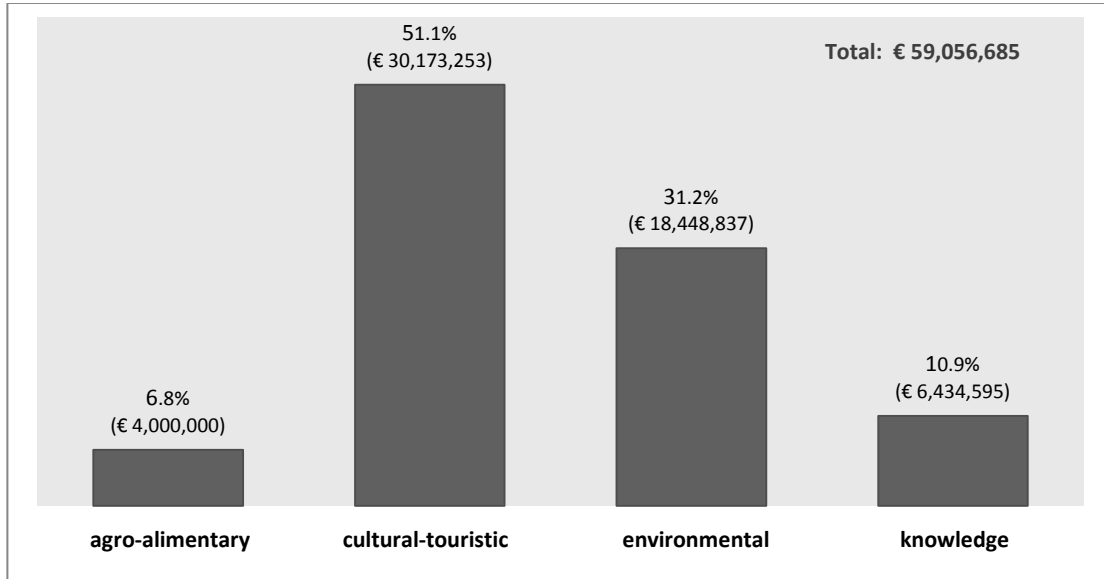
<ul style="list-style-type: none">▪ Agro-alimentary complex▪ Cultural-touristic complex▪ Environmental complex▪ Knowledge complex
--

Source: Author

According to the Region of Crete (2015), the agro-alimentary complex refers to a set of activities linked to the primary sector and aims at *"producing high added value food that has high nutritional value"*. The cultural-touristic complex targets activities in the tourism and cultural sectors such as hospitality, transpiration, promotion of cultural resources etc). The environmental complex refers to energy saving, renewable energy, climate change, while the knowledge complex focuses on the research and university institutions of Crete which promote state-of-the-art technologies in nanotechnology, biomedicine, biology, microelectronics, materials etc. The available funding through the

Operational Programme of Crete for each of the selected R&D domain is shown in Figure 6.3.

Figure 6.3 Available funding by selected R&D domain (Region of Crete)



Source: Elaborated data by the Author (based on <http://ris3.crete.gov.gr/download-files>)

The four selected domains were outlined in the first edition of the S3 document which was approximately 100 pages long and included also a detailed overview of the most important socioeconomic and structural characteristics of the island. We gained access and elaborated the content of the S3 document and we found that most of its details were based on the analysis of secondary sources gathered by previous reports and regional studies (an enriched list of references and citations is included in the report). In its final version, the S3 document describes the macroeconomic performance of Crete, including useful information about key regional dynamics and recent trends in the business community and the R&D landscape. It also provides a detailed SWOT analysis, based on the availability of qualitative and quantitative data at the sub-national level, as well as, other practical aspects concerning the methodology and the governance adopted for the purpose of S3. Overall, the report is analytical and

straightforward; it describes Cretan traits from different perspectives and attempts to provide a detailed outline of multi-level key policy recommendations. The selected R&D domains are those that one could expect to see for Crete and, in general, they are well fitted with the industrial structure of the island. A representative view on the smart specialisation priorities is given by RACr4 (2014):

The S3 domains selected for Crete are those that one should expect, agro-food, tourism, services. These are economic areas in which Crete could show a competitive advantage in the future (RACr4, 2014)

However, it is important to mention that in its final version as approved by the EU, the S3 report does not include a detailed plan for the implementation of specific actions. The lack of a clear and analytical action plan can be evidenced by reviewing the full version of the RIS3 of Crete (in Greek) which is available online at the official site of the region alongside with a short executive summary (in English)⁸.

6.4.2 Place-specific actions and regional tools for S3 design

During the analysis we identified a number of regional initiatives and actions which seemed to have affected the design of S3 in the region of Crete. Four main policy tools to strategy design have been identified and highlighted in the interview data. These are the creation of a new S3 working group to initiate S3 practices, the work of the Regional Innovation Council, the exploitation of previous experience in regional innovation and strategy, and the formation of new innovation supportive programmes. Table 6.3 summarises the interview results as to what the respondents believe about the importance that each of them has played in the design of S3.

⁸ <http://ris3.crete.gov.gr>

Table 6.3 Respondents' attitude on key forerunners of S3 design

Policy instruments for the design of S3	No of respondents	Percentage*	Quotes
S3 experts	12	40%	16
Regional Innovation Council	19	63%	24
Outcomes from previous projects	14	47%	12
CRINI Project	9	30%	7

(*)Based on a total number of 30 interviews conducted for Crete

Source: Author

6.4.2.1 Smart specialisation experts team

To start the design of S3, the Managing Authority set a smart specialisation working group consisted of seven top-level experts from diverse stakeholder groups of the local productive system. We held in-depth face-to-face interviews with all group members to understand the role of this team as a smart specialisation strategy tool and its policy contribution in the early stages of S3. The structure and expertise of each team member as came out from our analysis are illustrated analytically in Table 6.4.

Table 6.4 Cretan S3 experts team

	Professional occupation of experts	Area of Expertise	Type of expertise
1	Executive Secretary, Region of Crete	Public sector	Strategic objectives and vision of Crete
2	Director, Managing Authority, Region of Crete	Public sector	Implementation of Regional Operational Programs, national and EU delegations
3	Director, Institute of Electronic Structure and Laser, Foundation for Research and Technology	Academia	Polymer Science & Engineering, management of STI initiatives
4	Director, Science & Technology Park of Crete	Private sector	Regional development, managing entrepreneurship, R&D collaborations
5	Technical advisor, Heraklion Chamber of Commerce	Private sector	Business and industrial sector
6	Director, Geotechnical Chamber, Crete	Private sector	Food & Agriculture
7	Private Consultant (paid work)	Private sector	Preparation of S3 reports and studies, industrial expertise

Source: Author

The S3 group consisted of one representative from academia, three experts from the private sector, one private consultant (paid work) and two senior staff from the regional government. The creation of the S3 team was regarded as a main policy tool for initiating and putting in place the strategic design of smart specialisation. The idea of setting a rather small number of experts to initiate S3 design was based on a deliberate action of the region to reduce time-consuming processes and achieve additional flexibility. As explained in the following quote, previous experience from Crete shows that a number of past meetings, workshops and other typical local events failed to fully bring the required results, due to their bureaucratic nature (e.g. time-consuming processes for official approvals). In regards to this matter, there is a clear indication from the interviewees (members of the S3 team), that their selection aimed

at speeding up the procedures of S3 and, simultaneously, ensuring an unofficial representativeness of the quadruple helix of Crete: industry, academia, government and civil society. Moreover, they suggest that this decision seemed effective as the selection of a small number of experts quickly and rather implicitly was a crucial factor which facilitated the prompt beginning of the smart specialisation procedure. A Cretan expert from the S3 working group explains:

It was a working group consisting of individuals, not representatives of organisations or businesses, who had a deep understanding of the local productive system of the island. They didn't want to give this group an official character in order to make sure that work will be done effectively without delays or other barriers occurring in typical official meaningless meetings (ANCr11, 2015)

Interestingly, the case of Crete highlights a set of practical benefits in relation to how the decision to set a small S3 working group overcame bureaucratic challenges and affected the early stages of smart specialisation. In respect to the facilitation of the initial S3 stages, another Cretan interviewee points out:

The invitation was given directly to individuals. Smart specialisation coordinator used personal contacts to approach experts, who were very well informed about the current situation of Crete from many different perspectives: economical, technological etc. This methodology was mainly followed to avoid time-consuming processes and speed up the whole effort. I mean, we wanted ten people, experienced people, who could come up with a kind of smart specialisation action plan very shortly. This was the main idea (KACr12, 2015)

The above quote shows an informal process in which S3 was organised through unofficial meetings, delivering further flexibility (e.g. ease to set, cancel or postpone meetings due to the limited number of the participants; meetings normally conducted on time without significant delays; participation was accomplished by the same people, making much easier any necessary follow-up action; meetings were friendly and fairly

informal allowing for less stressful situations etc). What makes the case of Crete interesting in these first stages of the smart specialisation design is the process per se, which shifts from various outdated policy routines and traditional practices to a more effective and straightforward model of policy co-ordination and action. Furthermore, in order to ensure flexibility and effectiveness, the Cretan S3 co-ordinators established a fast-track policy instrument to promote bottom-up action. The novelty in this approach was the fact that S3 experts were asked to act as individuals and not as representatives of their organisations. By doing so, no institutional permissions and official approvals were necessary for the experts to take part in the S3 process. Additionally, most of the opinions, suggestions and policy recommendations were freely expressed and documented by the experts at an individual basis, without having undesired delays as normally happen when organisations have to respond officially.

We have collected evidence which suggests that S3 working group was successful. Two indicative quotes show the effectiveness of the meetings and the good collaboration among the members of the S3 team:

Yes, meetings worked really well, we had productive discussions from which some good ideas emerged (ANCr11, 2015)

Yes, of course it worked well, there was only one issue related to me, but not really a conflict, just a different opinion regarding an optimum equilibrium between basic and applied research. There were people from academia who tried to promote basic scientific research, maybe more than the expected level, and my opinion was to start thinking further how applied research could be exploited (KACr12, 2015)

The ultimate objective of the S3 group was to prepare a working document with the aim of supporting the Managing Authority of Crete to create a first draft of the S3 document. To achieve this goal, five meetings were organised over a period of approximately 2.5 years. All group members we have interviewed confirmed the creativity and efficacy of the meetings.

6.4.2.2 Regional Innovation Council of Crete

Crete was the first region in Greece which set an innovation council at the sub-national level. One of the respondents with a key role in the formation of the RIC Crete says:

Crete is the first Greek region which realised the importance of setting a regional innovation council, I think it was established in January 2011 (SACr1, 2014)

The Regional Innovation Council of Crete (RIC Crete) was found in January 2011, aimed at operating as an advisory body of the region for the promotion of science, technology and innovation. While the RIC Crete cannot be directly regarded as part of the smart specialisation process, it could be seen as a complementary tool aiming at creating favourable conditions for the design of S3. Furthermore, the interviewees suggest that the work of the council has contributed to the early reflection and adoption of S3 by nurturing a more favourable environment. SACr1 (2014) highlights its value by mentioning that:

The innovation council was perhaps the first official tool of the region which attempted to network key local actors, its work accounts a series of developmental studies in diverse economic areas which were later used to support the design of smart specialisation (SACr1, 2014)

The RIC Crete supported the creation of inter-regional collaborations. A number of key local actors came closer to each other, they shared common problems and challenges and created mutual patterns of collaborations through the formation of ten thematic working groups. The representativeness of these groups covered a wide range of different fields, stimulating a broad participation from both the private and public sector. Official records from the RIC Crete suggest that more than 200 high-level

experts from 50 organisations, authorities and companies have been engaged actively in the working groups covering a wide range of expertise (see Table 6.5).

Table 6.5 Regional Innovation Council of Crete experts per thematic group

RIC Crete working groups	No. of participants	Type and area of expertise
Primary sector	113	Members of the regional council, representatives from regional authorities, municipalities, trade unions
Entrepreneurship	25	Academics, business consultants, entrepreneurs, companies' managers
Green development	16	Civil engineers, representatives from the Technical Chamber, entrepreneurs,
Health	8	Researchers, academics, entrepreneurs, members of the regional council
ICT	23	Researchers, academics, SMEs, entrepreneurs, business associations
Environment	24	Researchers, academics, representatives from regional authorities and municipalities
Energy	21	Academics, researchers, entrepreneurs, representatives from the Energy Agency of Crete, private consultants
Tourism	35	Tourist operators, representatives from municipalities, hoteliers, tourism entrepreneurs, academics
Culture	19	Researchers, representatives from heritage culture places, museums, archaeology

Source: Elaborated data by the Author (based on <http://ris3.crete.gov.gr/download-files>)

Apart from setting the basis for creating a more productive cooperation framework, systematically missing from the regional innovation agenda, the RIC Crete produced a number of practical tools increasingly valuable for the design of S3. The respondents from the S3 experts team draw attention to the following as the most important ones, which were used to support the prioritisation process: preparation of policy suggestions geared to overcome the financial chaos; proposals for the creation of permanent institutional tools to support innovative entrepreneurship; identification,

collection and categorisation of a huge number of regional studies, thematic reports, academic papers, historical documents, indicators and statistics.

6.4.2.3 The value of previous experience in innovation strategies

The experience from a mixture of previous innovation and strategy programs (e.g. Regional Innovation and Technology Transfer Strategy-RITTS Project, Crete Innovative Region-CRINNO, Regional Innovation Pole etc), appeared to have a supplementary role in enhancing the design of smart specialisation. The evaluation of the previous generation programmes provided policy learning outcomes and assisted S3 expert group to avoid past mistakes and take advantage of positive elements. We interviewed 5 of the past innovation council of Crete. The evidence suggests that experience from the RITTS project helped understanding better the systemic view of innovation (e.g. how innovation works in a systemic way, what barriers exist etc) and get better prepared to embrace these critical elements into the design of the new innovation policy framework of S3⁹. In regard to this, SACr1 (2014) says:

The RITTS Project was a great opportunity for Crete to start designing regional policies and strategies for the first time [...] RITTS urge local actors coming closer, get familiar with each other and start thinking of how to work together for innovation policymaking. RITTS was a great school, and we have taken into account its experience when addressing the design of S3 (SACr1, 2014)

The example of RITTS shows that such programs were not only considered as an important means of policy analysis and planning, but also as a source of new innovation learning and strategic thinking in the context of S3.

⁹ The RITTS Project was the first collective endeavour of the region to consider the design of regional innovation policies from a more analytical, strategic and systemic perspective; analytical and strategic in the sense that actions were designed and conducted collectively, and systemic in the sense that various key local actors were officially engaged in many different phases of the project.

6.4.2.4 Crete Innovation Initiative (CRINI)

The Crete Innovation Initiative (CRINI), introduced very recently as an idea to give local economy a knowledge-based approach (Region of Crete 2015), seems to becoming a new promising tool for supporting policy actions related to the design and implementation of smart specialisation. Previously, the design of innovation policymaking was almost entirely conducted by the central government in collaboration with certain regional authorities. CRINI seeks to change this policy routine by supporting entrepreneurial actors from the local private sector taking the role of an active driver for regional design and development. We interviewed 3 key persons with a direct engagement in the formation of CRINI. Its emerging role within the S3 framework is documented in the following statement provided by one of the Cretan respondents from the governor office:

It's time to see how firms and other organisations from the private sector can contribute to the design and development of new innovation strategies. In the context of smart specialisation, this process will be done by CRINI (RACr4, 2014)

Similarly, the majority of the interviewees, either from the public or the private sector of Crete, strongly believe that the CRINI initiative will not only assist inter-regional collaboration during the entrepreneurial discovery, but it is also expected to provide significant guidance in the overall effort of the region to achieve its S3 objectives. SACr1 (2014) provides an indicate view on this attitude:

The Crete Innovation Initiative, we call it CRINI, is a new initiative started from Crete with the aim of promoting knowledge-intensive entrepreneurship. We expect from CRINI to facilitate collaboration for developing smart specialisation [...] It's a new policy tool which can be used by the region to fulfil its smart specialisation objectives (SACr1, 2014)

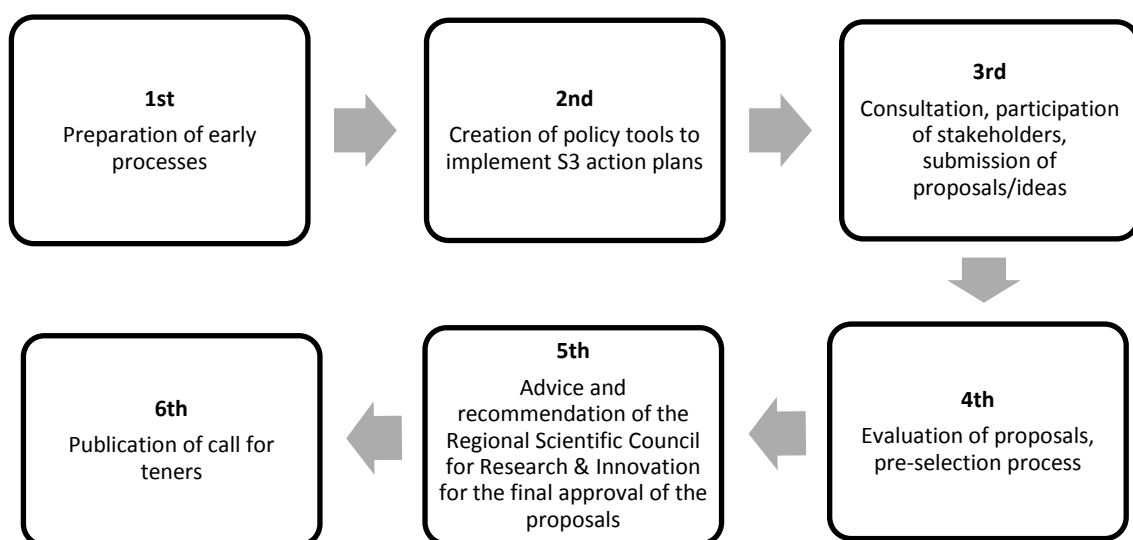
Currently, CRINI takes an active role through the collaboration agreements signed between public and private actors, with the objective of jointly designing and putting the basis for developing the new S3 framework.

6.4.3 The implementation phase: regional actions and policy tools

Officially, the implementation phase of the Cretan S3 action plan was started in the middle of 2017, under the supervision of the General Directorate of Development Planning which, administratively, is divided into four units (we recall that the design phase was undertaken by the Managing Authority). To understand and outline the steps undertaken during the implementation of S3, a second round of data gathered from longitudinal analysis conducted in summer 2017 were analysed and used.

In general, the implementation of smart specialisation in the region of Crete started with the creation of four new S3 working groups. The main responsibility of these groups was to create and develop a detailed action plan for each of the four selected domains, based on the outcomes of the consultation process and the entrepreneurial discovery. From our analysis we can observe six main stages conducted for the implementation phase as illustrated in Figure 6.4.

Figure 6.4 A 6-stage approach for the implementation of the S3 pilot projects



Source: Author

Description of the implementation stages

Preparation of early processes

In this first stage, a number of supportive actions were undertaken by the General Directorate of Development Planning (from now on S3 co-ordinator), with the objective of preparing and facilitating various preliminary procedures, appropriate to support the realisation of smart specialisation in the region of Crete. One of the first priorities was to form a new and updated business register, which was still missing at that time from the region in a clear and comprehensive structure. Interestingly, DACr44 (2017) reveals:

One of our first priorities was to make a new business register to find all private firms and start informing them for the activities of S3. We created one business register for each S3 area. This was the most hardest part, because we had to make a new list almost from scratch (DACr44, 2017)

The creation of this new business register was seen as an essential smart specialisation tool, geared to provide complimentary support to S3 co-ordinators. As DACr44 (2017)

points out, this first stage was quite complex as the process of collecting the required information was not straightforward but rather time-consuming. The new business register was developed separately for each smart specialisation domain, by geographical area (per prefecture), aiming at creating an effective communication channel between the S3 co-ordinator and the local firms (which potentially would take an active role in the smart specialisation practices).

Interestingly, as regards to the communication strategy of the region, a mixture of tools such as direct communication via emails and phone calls, focus groups, thematic meetings and face-to-face visits throughout the region were introduced. The *type* (mixture of means including different communication tools e.g. focus groups, distribution of self-evaluation questionnaires, provision of information per target group etc), *intensity* (e.g. increased number of face-to-face visits in a long period of time) and *extent* (visits in many different cities in all prefectures) of this new way of collaboration was certainly novel for the region, as no similar actions have been collectively conducted in the past for such reasons. The new way of thinking policy implementation and communication in the S3 context is highlighted by DACr44 (2017):

We started from the agro-food sector, we organised the first informative workshop here in Heraklion. Last Wednesday we went to Ierapetra, on Friday in Chania, and we are going tomorrow to Rethymno. In the 21st we are going to visit Mires (DACr44, 2017)

This new approach to local entrepreneurial actors, increased the potential for developing a more effective strategy as an increased number of local actors from diverse regional areas were given the opportunity to take an active role in the discovery process. In previous programming periods, the design of regional innovation policy making was mainly conducted centrally in Athens and very rarely in main regional cities.

Creation of policy tools to implement S3 action plans

During the interviews with the S3 co-ordinator, the creation of two key policy instruments was highlighted to facilitate the realisation of the smart specialisation action plans at different stages of development: *the regional innovation platforms* and *the unit for the development of entrepreneurship*.

i. Creation of regional innovation platforms per R&D domain

To support the entrepreneurial process of discovery, four open innovation platforms were created at the sub-national level (one for each selected domain). As it is expected at the national level (see Figure 6.1), the introduction of the innovation platforms was intended to play a complementary role in the creation and development of the S3 action plans, by providing different levels of support to the participating organisations. It is the first time when such a policy initiative was launched in the regional setting with the objective of facilitating university-firm research collaborations and supporting the encouragement of inter-regional synergies. In respect to this, DACr44 (2017) highlights:

We want to use innovation platforms as a means to support the collaboration of universities and research centres with local firms, to help scientists come closer to the businesses community and vice versa (DACr44, 2017)

Region of Crete (2015), indicates other objectives that the S3 innovation platform seeks to meet in the S3 context:

- to facilitate inter-sector knowledge flow and support the exchange of place-based expertise and know-how within the selected domain
- to create and exploit joint strategic tools (e.g. develop common tools for protecting and managing Intellectual Property Rights)

- to reinforce the linkages of the quadruple helix
- to boost technological innovation in multidisciplinary areas

ii. Establishment of the Unit for the Development of Entrepreneurship

The Unit for the Development of Entrepreneurship will be set as a new regional structure to support S3 practices in the long-run. Particularly, the main aim of this permanent instrument will be to support all stages related to the entrepreneurial discovery. DACr44 (2017) has indicated the following tasks in our discussion:

- To introduce co-ordinated and constant actions towards bridging the industry-academia gap at the level of the region. An e-platform, in which S3 players (existing and potential) can be registered will be designed and created. Through this new initiative, the region of Crete will take an informal intermediate role for supporting intra-regional collaborations research bodies and local firms.
- In connection with the Regional Scientific Council for Research & Innovation, the Unit for the Development of Entrepreneurship will also have a monitoring role in relation to progress in implementing the S3 in Crete.

Participation of stakeholders, submission of proposals and open consultation

This dynamic stage included different processes, aiming at bringing together diverse groups of local stakeholders and engaging them in diverse S3 practices. More precisely, once local actors were informed about the ongoing smart specialisation framework in Crete, the next step was to encourage their actual engagement by motivating them submitting their entrepreneurial proposals for future S3 projects and, later, by participating in open consultation processes. The purpose of asking and collecting these proposals was solely exploratory (e.g. to engage the local society in the self-discovery process with the objective of identifying what specialisations could be

emerged particularly for Crete), following the rationale indicated by the entrepreneurial process of discovery (Rodrik 2008; Foray 2016). Four open calls were published (one for each selected smart specialisation domain) inviting private firms, academic institutes and other local actors to bring ideas about what projects and under what particular synergies could be financed in the context of S3. To support the development of various integrated proposals and provide additional transparency and reliability to the process, the Cretan S3 co-ordinator set specific requirements. We participated in several S3 workshops and elaborated a number of presentations given by the S3 co-ordinator for each selected R&D domain (see Table 5 in Appendices). The analysis designates five key guidelines given to direct the creation of S3 proposals:

- Submission of clear and comprehensive ideas/proposals from different stakeholder groups
- Suggested ideas/proposals must be novel, reliable and mature
- Detailed description and justification of funding required
- Type and level of collaboration which is promoted
- Estimation of project timeline

The submission of the proposals was conducted directly to the General Directorate of Development Planning, through an online submission tool, ensuring confidentiality and privacy. All proposals were grouped into thematic classes, leading to the creation of different thematic groups for public consultation. The number of the submitted proposals and the number of the related thematic groups are presented in Table 6.6.

Table 6.6 Number of submitted proposals and consultation groups per RIS3 domain

RIS3 domain	No. of proposals	No. of thematic groups for consultation	Area of thematic groups
Agro-food		n/a	
Tourism-culture	66	4	<ul style="list-style-type: none"> i. ICT for alternative tourism (group A) ii. ICT for alternative tourism (group B) iii. Promotion and enrichment of tourist products iv. Marketing and promotion of tourist products
Environment	57	3	<ul style="list-style-type: none"> i. Sewage & Wastewater Treatment ii. Intelligent technologies in managing environmental and energy problems iii. Materials for the environmental application; optimisation of energy consumption
Knowledge		n/a	

Source: Elaborated data by the Author (based on <http://ris3.crete.gov.gr/download-files>)

Evaluation and approval of proposals

The last three stages refer to the evaluation of the proposals, the approval of the consultation process and its outcome, as well as the finalisation of the specialisation areas to be selected after the final recommendation of the Regional Scientific Council for Research & Innovation. During these processes main focus was primarily given on the possibilities of creating intra- and inter-sector collaborations, aiming at maximising the number of synergies in which potential S3 beneficiaries could have a role to play. DACr44 (2017) says:

We really need to create a culture of collaboration, we want to encourage and promote intra-regional synergies through the smart specialisation projects which will be selected for funding (DACr44, 2017)

While networking among regional entrepreneurial actors was ranked top S3 priority, at the time of writing this thesis, the evaluation of the submitted proposals was in progress and, therefore, no S3 calls were released to fund specific networking activities and synergies.

REGION OF CENTRAL MACEDONIA

6.5 Smart specialisation practices in Central Macedonia

The following sections discuss the way smart specialisation practices were conducted in Central Macedonia (CM). As we have done for the case of Crete, focus is mainly given on formulating the narrative of the design and implementation phases carried out in the region. Concerning the latter, it is noted that the implementation phase covers the period up to the publication of the first calls for tenders (middle 2017), as the actual realisation of the S3 (through specific projects) has not started yet.

6.5.1 S3 overview, entrepreneurial discovery and priority areas of Central Macedonia

Moving the regional innovation agenda forward, CM initiated its smart specialisation strategy in the first quarter of 2013, when the regional governor approved a diverse network of local experts, responsible for the development of S3. As to the first smart specialisation steps, a key member of the S3 co-ordination group says:

Smart specialisation started on April, 2013 by creating the network of the experts of the regional innovation strategy, which consisting of representatives from local business bodies, from academic community and from the regional administration, the so-called triple helix (KOCM25, 2015)

The formation of this new S3 network was the first official step to incorporate the idea of smart specialisation as a regional innovation strategy and start designing its strategic framework in a collective and systematic way. Following a slightly different methodological approach comparing to Crete, this broad network consisted of an increased number of individual experts (mainly for the greater area of Thessaloniki), who officially represented a wide range of different stakeholder groups including various regional authorities, local academia and business sector, as well as, other key players from the regional productive system of CM. We recall that in the case of Crete, this early step was taken unofficially by a small group of individuals directly allocated by the regional authorities (see Table 6.4). Specifically, to address an adequate critical mass suitable to initiate S3 preparatory actions, more than 30 local actors were involved in the early stages of the design phase (see Table 8 in Appendices). The main reason for involving an extended number of local players was to achieve representativeness and effectiveness and meet the objectives of the discovery process as indicated in the S3 literature; see for example (Landabaso and Foray 2014; McCann and Ortega-Argilés 2015; Capello and Kroll 2016). One of the Central Macedonian respondents with an administrative role in the design of S3 explains:

Our scope was to achieve high representativeness from different stakeholder groups, to inform as many organisations as possible about what smart specialisation is and what we want to do (MACM20, 2015)

According to the S3 co-ordinators, representativeness was secured by inviting and stimulating the engagement of an increased number of high-level experts from a large number of organisations located throughout the region. Effectiveness was guaranteed by identifying local actors with pronounced experience and high interest in the development plans of the region.

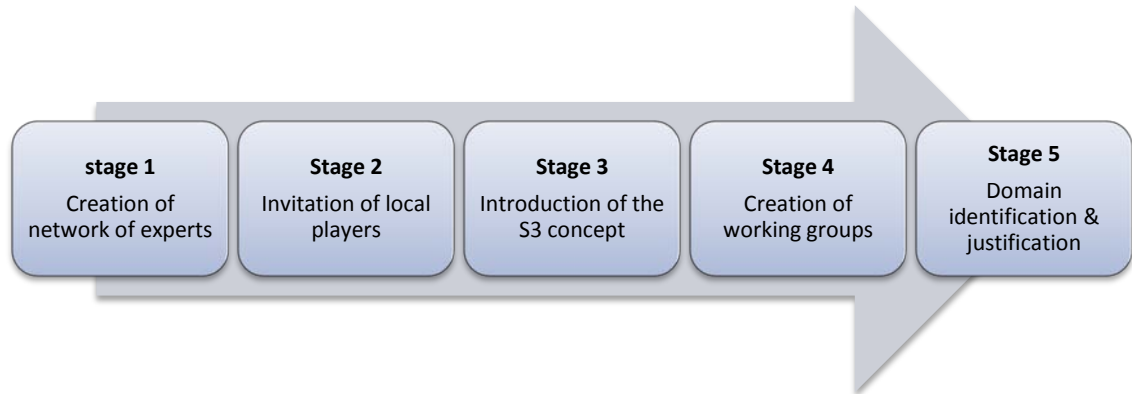
6.5.1.1 The entrepreneurial discovery in Central Macedonia

The regional authorities of CM addressed entrepreneurial discovery as a continuous and dynamic procedure divided into two separated phases. The adoption of a two-phase approach is a particular strategic decision for CM which indicates the way local policy experts addressed S3 rationale in practice. The first phase refers to the practices carried out for the prioritisation and final selection of the smart specialisation domains; its analysis remained at a rather general level without providing a detailed action plan. As explained by KOCM21 (2015), in this first part, the main aim was to examine specialisation at a broad level through the exploitation of quantitative data and statistics (e.g. trends of markets, economic areas with strong competitive advantages, available innovations and technological applications etc):

In the beginning we identified the domains of smart specialisation and then we tried to see what specialisations could be emerged from these domains (KOCM21, 2015)

KOCM25 (2015) refers to five main steps which relate to the early stages of the S3 design (see Figure 6.5). The first two stages aimed at creating a network of experts and providing a broad invitation to local actors to participate in the S3 practices (it is noted that at that time smart specialisation was a new idea and its conceptual understanding weak as documented in various interview quotes in this section). Later (stage 3), the objective was to focus on more specialised actions and create a first solid understanding around S3, followed by stages 4 and 5 in which six thematic working groups were created for the domain identification, selection and justification.

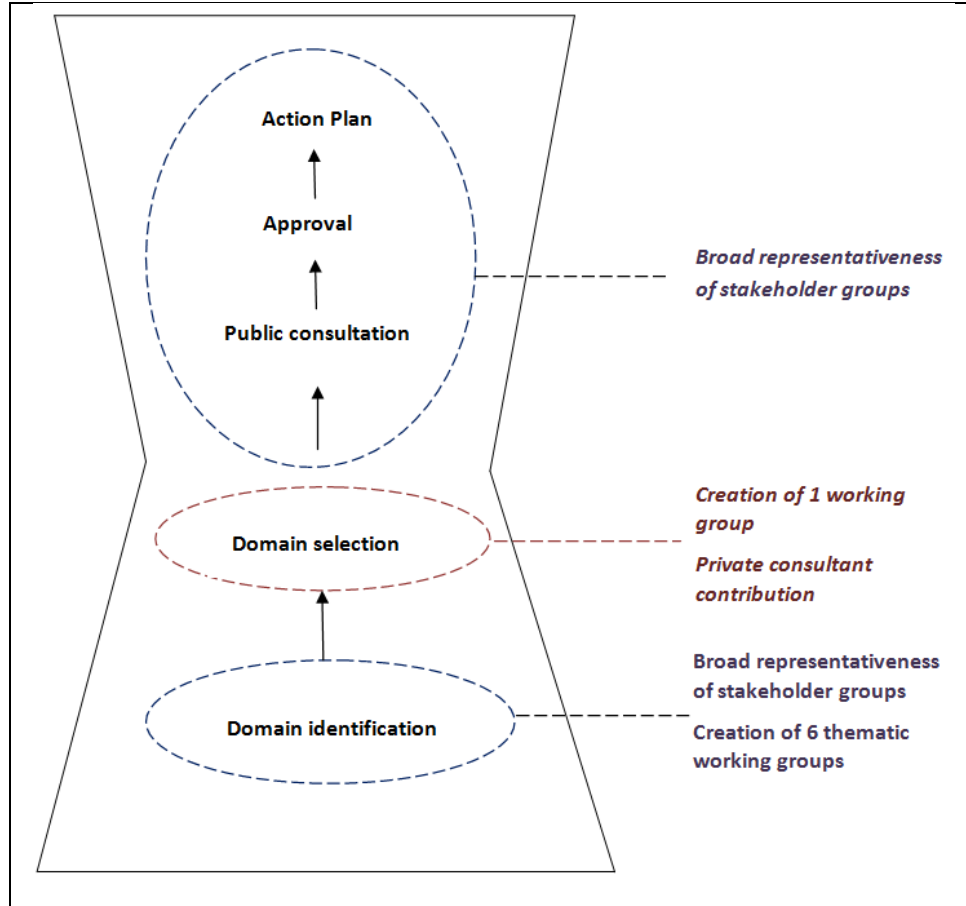
Figure 6.5 Early steps during the design of S3 in CM



Source: Author

Once domains were identified and justified, a second more focused phase followed, aiming at proving further specialisation by identifying particular areas of actions within the selected domains (e.g. specific areas of expertise with increased potential for future economic development). The first methodological steps of CM to run the entrepreneurial discovery were based on a broad-to-narrow approach, followed by widely open and transparent practices (see Figure 6.6). This option fits well with the ongoing smart specialisation literature, which indicates broad practices and expanded stakeholders' engagement during the entrepreneurial discovery (Foray 2016; McCann and Ortega-Argilés 2016b; Sörvik et al. 2016). In contrast with the early stages conducted by the Cretan S3 co-ordinators, various local actors from different stakeholder groups were mobilised and encouraged to participate in a continuous self-discovery for the identification and prioritisation processes of the region. This was the first collective effort of CM authorities to examine what local adaptation would be more relevant to systematically address the new S3 framework.

Figure 6.6 Entrepreneurial Process of Discovery in CM: a snapshot



Source: Author

As shown in Figure 6.6, the preparatory work of the identification of the S3 domains was based on a wide participation of diverse entrepreneurial actors through the creation of six thematic groups, while the selection of the domains was conducted by a revised group of local actors consisted of one working group. The involvement of the business community in these first stages (e.g. local entrepreneurs specialised in several business fields) was limited given that firms were mostly represented from their official collective bodies, (e.g. chambers of commerce) and from the entrepreneurs themselves. An indicative excerpt follows:

There were a large number of participants in our events, and I think, in general, it worked well. However, we faced many problems in persuading businesses participate in our meetings (KOCM21, 2015)

The problem of stimulating the interest of local entrepreneurs was overcome in the following steps (public consultation, final approval and action plan) as a broad participation and representativeness was achieved. Interestingly, apart from the difficulties to stimulate and motivate the interest of private firms, the responses show that the formal approach of the entrepreneurial discovery acted as an inhibitory factor which appeared stressful, and at some point, unproductive. Furthermore, this was mainly due to the increased hesitation of many participants to officially express their strategic suggestions, fearing that they will be accused of supporting dark powerful interests and malevolent lobbying (this was pretty well related with the public institutions such as universities and research centres). The above view is well grounded in our quotes presented below:

I think the most crucial challenge was to persuade institutes and local organisations to participate in the working groups without any fear, you know to make them realise that, in fact, they had nothing to lose from their participation and contribution in the workshops. [...] participants from the business community appeared cautious because, you know, the entrepreneurial process of discovery attempts to identify critical economic domains, so what happens if some of the participants, I mean the entrepreneurs see that their business activities or interests are not having a critical role in the selected sectors and that their businesses may not concentrate the interest of the others? This makes them cautious, and this is a challenge that one has to tackle when conducting the entrepreneurial discovery (KOCM25, 2015)

Showing a quite similar opinion, another interviewee says:

We delivered questionnaires and we asked from all participants to provide written feedback, we did receive some, not very useful and to the point though; however, an important number of representatives were

hesitating to provide feedback officially as they had to get a formal approval from the board of directors of their institutions [...] in order to persuade them sending some fruitful feedback we just mentioned that the provided information will not be published, it's just to help us understanding better the complexities and difficulties that each organisation might experience within the smart specialisation framework in order to act accordingly (MACM20, 2015)

As it turns out, two critical issues are found to play a challenging role in particular stages of the S3 design phase in CM. The first challenge relies on the difficulty of the CM milieu to gradually drive out the fear of picking winners and usual suspects. It is also linked to the relatively complex process to conceptualise smart specialisation as a collective endeavour to design joint development plans geared to support a wide range of businesses in cross-sector areas. The second challenge indicates the multifaceted nature of the complexity that local bodies are likely to experience when addressing smart specialisation. For instance, institutes' heterogeneity in terms of understanding and incorporating smart specialisation is very much stressed by the words of the second respondent.

To move S3 practices forward, more than ten parallel meetings were conducted per thematic group, mostly every two or three weeks until June 2013, as there was an obligation to deliver the first draft of the S3 document to the EU in July 2013. Specifically, MACM20 (2015) recites:

We created six thematic working groups, consisting of representatives from the majority of the organisations which have been invited to participate. Each organisation has a representative in each of the working groups. We started working with these teams, it was in March. Our discussions were centred on smart specialisation and what we could achieve. Each group worked towards identifying which products appeared to be the more appealing, what actions should be undertaken to produce such products. I have to say that some working groups worked really well. Meetings were quite often at the beginning, every 2 or 3 weeks until June, as we had the obligation to send a first draft to the EU in July 2013 (MACM20, 2015)

A systematic approach is revealed from the above quote, indicating clear tasks and obligations to meet the objectives of the entrepreneurial search processes. Meetings were organised regularly with the aim of putting the basis for identifying specific entrepreneurial actions for future specialisations. In order to provide an alternative perspective and move the progress of S3 forward, the six thematic teams were later grouped into one working team consisted of a limited number of participants. Respondents from the S3 co-ordinators claim that this option was meant to provide further flexibility and speed up the process. Indicatively, MACM20 (2015) says:

Later, the thematic groups became one big group, mainly for practical reasons, just to make things easier and support progress and speed up processes. So now we have one group called network of experts instead of having many thematic ones (MACM20, 2015)

The final outcome of the new group was the preparation of several draft documents which included policy suggestions and details in the following areas (Region of CM 2015):

- *exports*
- *environment*
- *foreign direct investments (FDI)*
- *ICT*
- *new product development*
- *creative sector and branding*

Afterwards, all S3 draft documents were elaborated by a private consultant with the objective of creating a finalised version of the S3 priorities to be released for public consultation. The consultation process was carried out in the city of Thessaloniki and finalised in June 2014, aiming to gather input from all interested stakeholders. We

examined the final S3 document for CM, created in 2015. It includes the macroeconomic characteristics of the region, the current entrepreneurial trends of the business community, the characteristics of the local academic system, a detailed SWOT analysis, and a thorough explanation of the selected R&D domains and their governance framework. It came up with four main priorities (see Table 6.7), which, in general, were accepted by the majority of the local productive system of the region. As to the approval of the S3 document, KO CM25 (2015) points out:

We submitted the final version of the smart specialisation document to the EU in May 2015 and some weeks later we received a letter mentioning that the document was accepted (KO CM25, 2015)

The official approval of the S3 document marked the end of the design phase and initiated the beginning of the implementation stage.

6.5.1.2 Priority areas in Central Macedonia

The entrepreneurial discovery in CM indicated four strategic priorities for future specialisation in the region, as well as, the horizontal use of key enabling technologies to support S3 action in each selected domain (Table 6.7).

Table 6.7 Priorities of S3 and key technologies for horizontal support in CM

Smart specialisation priorities	Key technologies for horizontal
<ul style="list-style-type: none"> ▪ Agro-food ▪ Tourism ▪ Materials ▪ Textiles and clothing 	<ul style="list-style-type: none"> ▪ Information and Communication Technologies ▪ Energy technologies ▪ Environmental technologies ▪ Transport and logistics technologies

Source: Author

According to the Region of CM (2015), the selection and finalisation of the CM domains was based on a set of criteria including the critical mass, the existing research infrastructures, the export orientation and the natural resources available in each of the selected priority areas. It is worth noting that CM is the only Greek region which has included the textiles and clothing domain in the S3 action plan.

6.5.2 The implementation phase: policy actions and tools

The implementation phase in CM began with the introduction of an additional round of consultation processes with the objective of identifying specific S3 action plans. During 2016, several workshops per leading sector were carried out to promote cross-sector networking and gather specific proposals for the specialisation and implementation of the selected S3 action plans. TRCM35 (2015) recognises this procedure as a continuation of the discovery process, with a key role in showing which S3 actions will be funded; he says:

In this new round of consultations public and private actors will be asked to submit their entrepreneurial ideas and proposals about what projects could be funded in each of the smart specialisation priority areas (TRCM35, 2015)

In addition, to monitor the implementation stage and assess the smart specialisation outcome at the medium and long-term perspective, a two-level mechanism was designed and expected to run. Furthermore, it will be a regional mechanism comprised of the creation of the Regional Scientific Council for Research & Innovation and the formation of a S3 one-stop-shop. Both tools are briefly discussed below.

6.5.2.1 Regional Scientific Council for Research & Innovation

The first level refers to the role that the Regional Scientific Council for Research & Innovation is expected to play in different developmental stages of S3. According to the Region of CM (2015), the establishment of the new innovation council is meant to have a key advisory role to the regional government regarding the evaluation and approval of the future S3 action plans. However, we should note that while there was an open call for applications for the appointment of eleven members since the end of January 2017, surprisingly, the innovation council was not created until July 2017.

6.5.2.2 S3 one-stop-shop

The second level indicates the task of a new self-directed unit for the support of innovation and entrepreneurship, which is responsible to assist and monitor the development of S3 in the region. In regard to this new policy instrument, KO CM25 (2015) says:

We plan to set up a one-stop-shop mechanism to assist the implementation of smart specialisation. The role of this mechanism will be to support all local actors involved in the development of smart specialisation (KO CM25, 2015)

It is noted that this new mechanism was approved and set in the region of CM in December 2017 with a total budget of 1.357.00 EUR (Region of Central Macedonia 2017). It has been argued that it is a new regionally-designed mechanism which is expected to provide fast-track entrepreneurial and innovation support services in the framework of S3.

6.6 Conclusion

This first empirical chapter aimed at creating a sound framework for clarifying the analytical issues of smart specialisation in the regions of Crete and CM. Its core objective was to answer RQ1 by providing an empirical understanding of the way smart specialisation strategies were developed in both regional environments. Particular attention was given to the design and early stages of the implementation phase, providing S3 implementation, monitoring and evaluation stages have not been fully started yet. In addition, given that Greek S3 is conducted both at the national and regional level, a brief overview was provided to introduce the basics of the national S3 framework, followed by a detailed analysis of smart specialisation practices carried out at the regional level. Apart from putting the base for developing the other empirical chapters of this thesis, the results of this chapter are intended to offer a set of conclusions which could be analysed and used beyond the boundaries of Crete and CM.

A first conclusion is that both case study regions experienced difficulties in understanding and adopting smart specialisation as a core regional innovation strategy. Specifically, we found that in the beginning, smart specialisation lacked conceptual clarity and understanding of practical adaptability, raising uncertainty as to what core and complementary actions should have been carried out to meet the objectives of S3 effectively. The data show that both regions faced challenges in conceptualising the theoretical and practical underpinnings of smart specialisation in the regional setting. Key findings indicate a wide range of interview perceptions as to how smart specialisation was understood and adopted in Crete and CM by different entrepreneurial actors. They suggest that the implementation challenge of S3 in Crete and CM derived from the fact that it was not clear what place-specific actions should have been planned to build and develop entrepreneurial search mechanisms, while S3 institutional roles and responsibilities at both the regional and national level remained fuzzy. This uncertainty increased institutes' inertia, blocked public policy intervention and caused delays in begging and implementing S3.

A second conclusion yielded from this chapter is that the selected regions followed a different methodological approach to design and implement their smart specialisation strategies. In particular, we evidenced different patterns of S3 behaviour between the two regions, and we showed that they are due to a different understanding and conceptualisation of the underpinnings of smart specialisation in the regional setting. For example, in the case of Crete, the first stages for the identification and prioritisation of the R&D domain were carried out by a small group of S3 experts, allocated unofficially by the regional authorities. While a broad participation of key entrepreneurial actors was absent from these early stages (it came later through public consultations), this option was selected to provide additional administrative flexibility, given that the identification process was further accelerated due to limited number of experts involved. The Cretan option indicates a place-specific approach to S3 policy action, in which speeding-up the process of the domain identification was a first priority, followed by the required consultation procedures to legitimate its outcome. On the contrary, in the case of CM, a wide involvement of diverse local entrepreneurial actors was attempted from the very beginning of the identification process to enrich S3 outcome and avoid criticism (e.g. provide equal participation opportunities for all developmental actors). Similarly, we indicated that Crete and CM created and used different policy tools to assist the design and implementation of S3. In the case of Crete, particular attention was given to the introduction of certain complementary instruments, including the regional innovation council and the Crete Innovation Initiative (CRINI). CM on the contrary, exploited the creation of a S3 one-stop-shop.

A third conclusion is that the final decisions regarding S3 policymaking and action were influenced by a series of place-specific characteristics which, to some extent, were different between Crete and CM. In particular, each region developed its own implementation path, based on its local specificities (e.g. local conditions, trends

and structures, endogenous dynamics) and capacities (e.g. ability to implement development strategies).

Closing the discussion in this first empirical chapter, we underpin that despite vagueness surrounding smart specialisation practices at the regional level, the evidence shows that S3 development can bring an added value to Regional Innovation System (RIS) approaches in catch-up regions. We saw that smart specialisation is an appealing regional innovation strategy in the selected regions, which is currently seen as the most appropriate development strategy for regional renewal and economic catch-up. The potential of S3 as a regional innovation strategy is evidenced in a Cretan and CM context by acknowledging its supportive role in overcoming developmental barriers and previous innovation policy inefficiencies.

Chapter 7: Governance reforms and institutional arrangements for smart specialisation strategies

7.1 Introduction

This chapter is a continuation of chapter 6 and seeks to investigate the importance of institutional and governance integration on smart specialisation. It addresses RQ2, which analyses evidence to provide an analytical answer to "*How do, and can, institutional arrangements and governance reforms impact smart specialisation practices*". RQ2 falls into two sub-questions, aimed to meet a twofold objective. The first sub-question, (*How do institutional arrangements and governance reforms impact on smart specialisation practices*) constitutes a systematic endeavour to understand empirically the ways in which existing institutional and governance settings are currently affecting the ongoing realisation of smart specialisation in Crete and CM. This first section is focused on analysing what specific institutional and governance arrangements have been shaped so far at regional, national and EU levels to regulate S3 practices in the case study regions. It constitutes the first part of this chapter. The second sub-question, (*How can institutional arrangements and governance reforms impact on smart specialisation practices*) seeks to investigate how a series of new or improved governance reforms and institutional arrangements could progressively affect the implementation of smart specialisation in the two regions. It is intended to identify what new forms of smart specialisation governance are relevant for Crete and CM and, simultaneously, examine what specific institutions might be necessary to facilitate their development. This section constitutes the second part of this chapter.

The importance of studying institutions and governance structures remains an important frontier for future research in regional development (Rodrik and Rosenzweig 2010). Hence, based on the underlying argument that institutional and governance

formation does matter for S3 at one end of the spectrum (McCann, van Oort, and Goddard 2016; OECD 2017b), and that different institutional arrangements would be needed for different regions at the other end (Tödtling and Trippel 2005; Gianelle et al. 2016), chapter 7 develops an abductive reasoning which elaborates a set of evidence-based findings to indicate when and how either small or fundamental interventions in institutions and governance structures can support the dynamics of implementing successful S3.

To develop a sound empirical framework and build our findings, we use data from both regional environments. Two key elements of regional development (policy governance and institutions) are analytically studied in this chapter, seeking to understand their impact on regional strategies and particularly on the development of S3. As explained in detail in chapter 4, we started the analysis in NVivo by creating 2 main nodes with a number of sub-nodes including a total number of 470 coding references (306 for the node *governance* and 164 for the node *institutions*). The finalised results included 379 coding references for governance and 222 coding references for institutions.

7.2 PART A: Current governance and institutional reforms affecting smart specialisation strategies in Crete and CM

To analyse and understand better how a series of present governance and institutional reforms are currently shaping the ongoing implementation of smart specialisation in the selected regions, it is useful to start this chapter with a brief introduction to the governance of previous regional innovation strategies. To this end, we analyse data gathered from the interviews, which include general and specific questions, aimed at understanding how previous regional innovation strategies have been regulated, to compare with what smart specialisation theory is currently proposing. Particular attention is given to understand the changing role of regional and

national strategists in developing and regulating new innovation policies at the regional level.

7.2.1 The governance of previous innovation frameworks in Crete and CM

A number of EU and national empirical studies suggest that the results of the previous generation of regional innovation policymaking (e.g. initiatives including the Regional Innovation and Technology Transfer Strategy-RITTS Project, Crete Innovative Region-CRINNO, Regional Innovation Poles, Innovative Actions Programmes) were not fully successful for catch-up regions due to poor governance and institutional structures; see for example the work of Beugelsdijk and Eijffinger (2005), Shankar and Shah (2009), who argue that past innovation policies lacked effective governance models and structural mechanisms to deliver policy integration. To verify these findings at the Cretan and CM context, we asked questions in the interviews related to the effectiveness and ways in which previous innovation policy frameworks were governed at the public level. The analysis, based on the views of 24 respondents (out of 32 who were asked to give their perspectives on this issue), reveals weaknesses in earlier governance models, e.g. limited contribution of local entrepreneurial actors in policymaking. More than half of the responses indicate that most of these weaknesses lie on a '*design nationally, execute regionally*' policy approach which has been largely introduced in previous programmes. Concerning this contradictory approach to govern innovation policies, a Cretan policymaker from the regional government mentions:

Regional strategies and innovation policies were designed centrally, funding was also managed centrally using national mechanisms, I think everything was designed centrally. So regions seemed to have limited options to govern their own innovation policies (RACr4, 2014)

In the same vein, to explain why past innovation policymaking was not that effective at the regional level, an interviewee from the Federation of Industries of Northern Greece says:

[...] it was because of the homogenisation of policies, which means that it's not correct to have the same innovation policies for Crete and for Central Macedonia, because these two regions are different. We can't just put everything together (GECM33, 2015)

Surprisingly, as both respondents point out, while such innovation initiatives were supposed to run regionally to trigger local change and boost regional development, they were centrally designed without securing the required engagement of the local entrepreneurial actors (e.g. as systematically proposed in the entrepreneurial discovery) and fitting the different needs that each region has. They also lacked permanent institutional tools, e.g. regional innovation councils to govern innovation policies at the regional level, funding mechanisms to promote knowledge-based entrepreneurship etc. This suggests that previous regional innovation strategies in Crete and CM were governed without the actual involvement of the local community. This is a notable element in the findings which differentiates the way in which previous generation of innovation policies were governed, comparing to the emerging practices of smart specialisation (in which the development of regional strategies is supposed to follow bottom-up approaches from the design to the implementation phase). The lack of public consultation and interplay among diverse entrepreneurial actors in the previous regional strategic framework, indicates a weak governance mechanism to implement successful regional innovation policies for local development. In the interviews, this idea is mentioned in a representative quote, which highlights the inefficiency of innovation support programmes to meet the needs of the local economy:

Policies are not designed to support local economy, neither to cover local entrepreneurial needs and regional development [...] the impact was limited and fragmented, for instance, see the RITTS programme (PECM26, 2015)

The above excerpt highlights the view that without the involvement of the local community to jointly build with the national authorities a strong governance model, innovation strategies have had little chance of success. It is worth noting that we pay particular attention to the lack of involvement of the local community in implementing regional innovation strategies, given that smart specialisation theory recognises the commitment of local entrepreneurial actors as a key success factor of S3 (Capello 2014; Landabaso and Foray 2014; McCann and Ortega-Argilés 2014). However, as discussed in the following section, this attitude seems to be changing in the S3 context in favour of regional policymaking.

7.2.2 The process of smart specialisation as a driver of change

Indeed, evidence from Crete and CM shows that part of the inefficiency of the previous governance structure is gradually changing alongside the deployment of the new S3 framework. There is a clear tendency in the responses, suggesting that this change is partly due to the functionality of certain methodological elements incorporated in the new strategic framework of smart specialisation, which have improved definite policy approaches. Referring to the importance of entrepreneurial discovery as a dynamic learning-by-doing process, a Cretan expert says:

An important added value that smart specialisation could bring to regional learning comes from the practices undertaken to run the entrepreneurial process of discovery (TSCr22, 2015)

This citation emphasises the systematic and collective way in which S3 is strongly suggested to be conducted in each region. This approach is highlighted in the findings

as a key driving force of change in innovation policy governance. As an example, we refer to the contribution of the discovery process to build a more effective institutional collaborative framework for the development of regional innovation strategies as illustrated in the following quote provided by a CM expert:

I think that the repeated and systematic efforts to engage a large number of organisations in the entrepreneurial process of discovery helped Central Macedonia bring closer diverse local players and institutionalise a more effective collaboration framework to support innovation policies (PECM26, 2015)

The idea that entrepreneurial discovery has contributed to improve the governance of innovation actions in the regional context (in this case in the sense that more local actors are encouraged to take place in the process in a more co-ordinated way), has been also acknowledged in a series of other interviews, generated mostly by a set of specific questions included in the interview guide (see questions 22, 23, 24 and 25 in Appendices, Table 6). The answers to these questions show a notable change in addressing the way in which smart specialisation strategies are currently governed and regulated among regional, national and EU levels. This view becomes more apparent in the longitudinal research datasets, in which a changing attitude towards S3 governance is increasingly captured. Table 7.1 summarises the number of respondents who believe that the current regulation of policies and practices is changing in the new S3 framework compared to previous innovation policy frameworks. It is worth noting that we have not captured any counter responses suggesting that policymaking and action within the S3 context is getting worse compared to previous practices.

Table 7.1 Number of responses indicating improvements in the governance of S3

Interviews	No. of respondents		
	Crete	CM	TOTAL ^(*)
1st round	7	5	25
2nd round (longitudinal)	9	n/a	10

^(*)Total number of respondents addressed this question

Source: Author

An analysis of the data from the first round of interviews in both regions, reveals that 12 out of 25 experts, for which we have directly addressed questions related to institutions and governance issues, believe that policy governance has been improved in some way during the smart specialisation period. This finding increases remarkably for the second round of interviews, (conducted only in the region of Crete - longitudinal fieldwork), in which almost all respondents (9 out of 10) see notable changes in the existing governance structure for innovation strategies. It is worth highlighting that the analysis does not refer to S3 policy outcomes per se, but rather to the way in which policy practices are governed and regulated to generate these outcomes. In this regard, a key point to discuss is what exactly is changing at present and how this change affects the implementation of S3 in the regions of Crete and CM. Elements from both aspects are analysed and discussed in the following sections.

7.2.3 Ongoing governance and institutional reforms for smart specialisation

The data suggest that institutions and policy governance for smart specialisation are currently changing in two central ways: policy governance attitudes, patterns and routines are changing in the sense that their regulation is conducted in a more intensive, collective and informed way; institutions are adjusting in the sense that a series of new policy structures and tools are institutionalised at the regional, national and EU level to support these new ways of policy governance in the S3 context. Table 7.2 shows the number of the respondents' perceptions as to what new institutional and

governance reforms are currently taking place and seem to impact S3 development in both case study regions.

Table 7.2 Number of responses highlighting ongoing institutional and governance changes for S3

Nature and type of change	No. of responses		
	Crete	CM	TOTAL ^(*)
Change in public administration attitude towards S3 governance	23	12	35
Intensity of policy practices	19	9	28
Institutionalisation of new policy tools and structures for regional development	16	8	24

^(*)Total number of answers

Source: Author

As shown in Table 7.2, we identify three different types of institutional and governance change, which are currently going on and affecting S3 in the Cretan and Central Macedonian context. The first is linked to a changing attitude in the understanding of how modern-new innovation policies can be better governed and regulated. The second refers to the emergence of new and more intensive patterns in which policy action is governed. The third relates to the institutionalisation of new and existing policy structures to support the governance of regional development. Each is analysed below.

7.2.3.1 Change in public administration attitude towards S3 governance

In general, the analysis identifies and discusses new ways of considering governance action for innovation policymaking at three administrative levels: the EU, national and regional levels. It also highlights the development of joint practices which can explain how these territorial levels interrelate with each other to govern the design and implementation of S3. In particular, one important reforming step we have identified in respect to the governance of S3 at all these levels, refers to an attitude

change as to how regional innovation strategies are currently considered and addressed in the new smart specialisation context. This attitude change in the public administration sector is expressed in the words of two Cretan respondents presented below:

I have to say that it's the first time that the region of Crete seems to consider innovation policy more seriously and thoroughly. I strongly believe this (ANCr11, 2015)

I think that peoples' perceptions are improving, they are not that reluctant to change, as in the past. It's true that people with leading roles from different public authorities used to be very sceptical and hesitant about smart specialisation, but not anymore. It seems that they have embraced smart specialisation rationale (TRCr9, 2014)

The data reveal a large number of similar responses (23 from Crete and 12 from CM) which highlight changes in certain governance trends for policy adjustments in the current European-national-regional collaboration. For example, a regional expert from the region of Crete explains how new EU-national approaches to innovation policy governance impact S3 practices at the regional level:

It's good to see the EU and the national government collaborate with each other to support regions develop their own action plans, and I think, this time, it works well as both the EU and the national government don't seek to indicate regions what to do, but rather to show them how to do it (KACr46, 2017)

The main idea observed from this view, is that EU and national authorities follow a new governance approach in which Crete and CM are further encouraged to exploit opportunities for self-learning. This is a notable difference in governing public policy towards overcoming regional policy weaknesses from centrally-designed actions conducted in the past. Likewise, other quotes indicate a clearly changing approach

towards the design of local policymaking, in which inter-regional collaborations may have a key role to play; for example, PECM26 (2015) points out:

S3 efforts should have an inter-sectoral and inter-regional approach where actors from different areas of expertise should collaborate with each other not only within a region but also among regions. For example, when conducting the entrepreneurial discovery, the region of East Macedonia and Thrace didn't only involve its own actors but also engaged other players from neighbour regions like Central Macedonia to acquire new knowledge and expertise (PECM26, 2015)

Both quotes underline the existence of an emerging attitude change which includes the adoption of a new perception in innovation policy making. Under this view, a more productive co-operation among European, national and regional institutions is emerging to support smart specialisation development in the regional setting. As to the first extract, the EU-national collaboration for governing innovation policies has been expressed in diverse ways in the Cretan and CM context. For example, the EU imposed the *ex-ante* conditionality to secure that European regions will progressively pursue S3 approaches to meet their strategic objectives. In a European context, the enforcement of this conditionality reveals an additional EU option to promote decentralised policy governance to be followed in the regional setting. In practice, it is a means of imposing specific governance guidelines and regulations in regional policies. In a Cretan and CM context, it reveals a new policy approach in which the establishment of permanent national-regional synergies for bottom-up innovation policymaking is for the first time taking an institutional role with the support of the EU. It also shows a dynamic endeavour to engage local entrepreneurial actors in the design of regional strategies, something which as shown previously, it was missing from the earlier innovation frameworks.

The extent to which this new European way of promoting and governing innovation policy supports policy actions at the regional level is clearly captured in the responses.

For instance, it is indicative that answering the question as to whether Crete or CM would have started S3 without the enforcement of the EU *ex-ante* conditionality, 37 out of 40 respondents in the first round of interviews admit that neither region would possibly have introduced S3 practices to design their new strategic framework. In regard to this aspect, an expert from CM says:

I think that the ex-ante conditionality is something which keeps the attention of the regions alive. Perhaps regions would have not treated smart specialisation very seriously if the ex-ante conditionality was not there [...] You know, regions don't really consider innovation and innovation actions as a first policymaking priority, as other important problems and challenges should be firstly managed and controlled, particularly during the period of the crisis (PECM26, 2015)

This evidence, along with the collective efforts of the national government to assist regions, follow S3 practises and meet the conditionality objectives (see the following sub-section), show the intention of European and national governance to give regions additional power for locally-designed regional innovation strategies. This is not only a policy option to innovation, but also a notable EU and national change to regional innovation governance, comparing to previous public policy action. This change favours the principles of S3 (e.g. encourage bottom-up interaction and place-based action), and as such, it should be primarily highlighted.

In respect of how attitudes to policy governance tend to change across different stakeholder groups in the case study regions, the data reveal a diversified mainstream between private and public sector actors. We ran NVivo coding queries to identify trends in policy attitude change among the key categories of respondents: public sector, academia and private sector (see chapter 4, table 4.3 for guidance). The main objective was to examine how perception of policy governance attitude is changing across different entrepreneurial groups. The results show that change in governance perception is found mostly in public sector responses, provided by respondents from

public authorities, academia, public agencies etc. Precisely, 29 respondents out of 35 who have indicated a changing attitude, come from the public-sector and academia, while 6 come from the private sector (e.g. firms, business associations, chambers etc). A possible explanation to this finding is that private sector respondents may be less optimistic about the effectiveness of public policymaking, given the fragmented results of previous policy frameworks (see section 7.2.1). Our assumption fits with previous empirical findings, which underpin that private sector firms are found unwilling to take a key role in public policymaking due to high levels of disappointment and uncertainty coming from the past; see for example Tsipouri and Papadakou (2005).

An example of changing public administration attitude towards S3

To show how the modernisation in innovation policy thinking affects S3 practices, we refer to a place-specific case indicated from the Cretan respondents. This case highlights a new way of regional policy communication, conducted in the hinterland of Crete with very good outcomes. The idea was to move from a rather traditional way of policy action (where local actors from many different places of Crete had to travel to the capital city of Heraklion to take an active role in local policymaking), to a non-typical and more flexible model of governing entrepreneurial discovery (in which Cretan S3 co-ordinators made several face-to-face visits to collect ideas and motivate the engagement of various regional actors instead of asking them to join open events in Heraklion). This was a pioneering action conducted for the first time in the region of Crete in a systematic, collective and co-ordinated way, which enabled the participation of different stakeholder groups throughout the island. DACr44 (2017) explains how this new and rather unconventional approach of governing the design of innovation policymaking facilitated S3 practices:

It's a good surprise for local entrepreneurs to see that we are going to their places to start a discussion with them, it's strange for them to see a public sector organisation knock their door and ask them to take an

active role in S3. So far, private actors were used to see public authorities with scepticism and this new way of S3 communication changed a little bit this old perception (DACr44, 2017)

The option of Cretan policymakers to think and govern S3 practices differently, is a good example of how small-scale modifications in the regional governance structures could overcome previous policy inefficiencies (e.g. lack of public trust and confidence) and lead to better policy results. Particularly, the Cretan case shows clearly how particular processes during the entrepreneurial discovery can be enhanced through soft reforms in the existing public sector governance regime.

7.2.3.2 Intensity of policy practices

Harmonised with the EU approach, both national and regional governments have also shown the first serious steps to reform innovation policy governance and induce institutional adjustments to favour these reforms in the smart specialisation framework. We found that at a national level, much of this effort has been devoted to support regions decentralise regional innovation action through the provision of additional independence for place-based policy design. At the regional level, important efforts have been made to change the degree of local interaction and engagement of regional actors in public policymaking. Both aspects embody elements of new policy governance and institutional reconfiguration, in the sense that they have been conducted in a systematic and intensive way comparing to previous governance behaviours.

Evidence of institutional and governance transformation at the national level, comes from a series of new public-action initiatives, intensively conducted to promote S3 in Crete and CM. The degree and extent to which these new initiatives were conducted by the central government, reveal a new way of governing regional innovation policies at the national level. Specifically, the early preparation of smart specialisation strategies in Greece began in 2010 through the collective efforts of the

EU (Directorate-General for Regional and Urban Policy), and later the national government (General Secretariat of Research and Technology-GSRT) to introduce in Greek regions the smart specialisation logic. In 2012, a four-member team was created, aimed at organising regional workshops to inform local communities about the rationale and the methodological steps to be followed in the smart specialisation framework. Most of the public sector respondents who have had a direct engagement with this endeavour (mainly S3 co-ordinators) highlight the systematic approach of the EU and the national government to shift Cretan and Central Macedonian policy governance routines into the new smart specialisation framework. The following quote provided by a member of the S3 team in CM is indicative:

The Directorate-General for Regional and Urban Policy recruited four experts to visit all Greek regions and organise informative workshops and events to explain the advantages of designing and implementing smart specialisation strategies, and also to let them know about the ex-ante conditionality for getting access to potential funding [...] I think all these governance actions included intensive and collective efforts to embody smart specialisation in the regional setting (PECM26, 2015)

From a policy governance perspective, the interesting point is in the way in which all these actions have been carried out. An analysis of the public sector respondents suggests that, no matter of its effectiveness and ultimate results, European and national endeavour to put S3 in the regional context was characterised by high intensity (embodies repeated and targeted actions) and high collectivity (mobilises multi local actors), comparing to previous efforts. It is indicative that almost all of the interviewees from the Cretan and Central Macedonian S3 co-ordination teams point out that European and national action to regional development seems to be, for the first time, in the right direction. The way in which the introduction of S3 early approaches was conducted by the EU and national authorities is summarised in the following insight provided by a Cretan interviewee:

I think there were many steps forward, many targeted efforts were made to promote RIS3 in a systematic way, given that smart specialisation is something totally new and unknown in the regional setting (TSCr22, 2015)

This summary quote constitutes a sort of evidence which indicates the ongoing efforts to address policy governance in the new and, at that time unfamiliar policy framework of smart specialisation in a systematic way.

7.2.3.3 Institutionalising and empowering existing and new tools for intensified S3 implementation

We know from the literature that the enforcement of appropriate institutional tools and mechanisms is possible to facilitate the governance of smart specialisation (Landabaso, McCann, and Ortega-Argilés 2014). The question, however, is what tools and in what ways. In the case of Crete and CM, the answer to this question can be found by analysing the new way that institutional tools are currently used and developed at EU, national and regional levels to regulate S3 in the regional setting. We found that the current S3 regulatory and administrative change discussed above is supported by a combination of institutional structures launched at all these three governance levels, promoting a multi-scalar endeavour for the co-ordination of regional development (Todtling, Asheim, and Boschma 2013). These structures differ from previous regulatory mechanisms introduced in similar initiatives, in the sense that they have been given a formal and institutional shape to regulate S3 policies and objectives in the long-run.

An example of such structure at the regional level is the creation of the new Regional Scientific Councils for Research and Innovation, which constitute a revised continuation of the previous Regional Innovation Councils, established well before the onset of S3. For example, in the case of Crete, the Regional Scientific Council for Research and Innovation consists of eleven individuals (with a four-year term), who represent a

number of regionally-based organisations (6 academics, 3 representatives from the wider business community and 2 from the public sector). The green light for setting up the new councils was given by the national government in 2016 to support the governance of regional innovation policies within and beyond the smart specialisation context. From a policy governance perspective, the difference with these new forms of innovation councils, (comparing to previous forms), is that they take a formal and institutional shape, which was neglected in previous shapes. In particular, the responses suggest that the new institutional dimension innovation councils are currently taking, makes it possible to bring better policy governance results, by strengthening further their authority and operation, and allowing for more smart specialisation flexibility and action. To back up this finding, we performed in-depth interviews with two members of the past Cretan Innovation Council. As shown in the following quotes, the respondents mention that the previous council lost part of its political power and led to organisational inertia because it was not given a formal institutional structure with comprehensible regulatory tasks and directions. Furthermore, to highlight the importance of the renewed institutional role of the new innovation councils in regulating local S3 practices, the interviewees cite:

I strongly believe that when regional innovation councils take a formal role, they will be more supportive and useful for smart specialisation. If innovation councils take a formal role, an institutional role, no one could devalue their usefulness. A formal research council, which may also have the power to allocate resources, is more likely to mobilise different players taking part in RIS3. So, yes I strongly believe that innovation councils can have a great role in the RIS3 only if they take a formal, a typical structure (OICr3, 2014)

The new regional innovation council of Crete, as it is designed and planned in the new law, with clear institutional tasks and responsibilities could also play a supportive role for the region of Crete in designing and implementing RIS3 (TRCr9, 2014)

Both extracts disclose that the previous innovation councils would not be able to fully assist the realisation of smart specialisation due to the lack of an official structure with clear objectives and tasks; this reveals the growing importance of revising and institutionalising new or existing regional tools to meet the governance objectives of S3. Surprisingly, while these new forms of regional councils are intended to play a key role in formulating the governance of smart specialisation at the sub-national level, at the time of updating this section (first semester 2018), only a few Greek regions have had composed their local councils. As to the case study regions we are examining in this thesis, the new innovation council has been established only for Crete.

In a similar way, the National Council for the Smart Specialisation Strategy was established in 2015 by the national government as a central institutional tool for the development of S3. It was a new initiative, co-ordinated by the Ministry of Economy, Development and Tourism, and comprised of representatives from the Greek ministries and the Association of the Greek Regions. Its main responsibility was to introduce a set of new regulations that will effectively shape the smart specialisation governance regimes and ensure, therefore, an effective implementation of the S3 priorities as identified and approved by the regions.

At the EU level, the new institutional tools to govern S3 regulation include the smart specialisation platform, established in Seville-Spain as a permanent supportive structure¹⁰. Also, to provide additional support at the regional level, the EU in collaboration with the national and regional governments, has organised a series of regional S3 events. Indicatively, we refer to the peer-review workshop organised in the capital city of Heraklion in September 2013, for which a Cretan S3 expert says:

The peer-review event organised by the EU and the region of Crete was really supportive and we actually got really good feedback for our work (ANCr11, 2017)

¹⁰ see <http://s3platform.jrc.ec.europa.eu>

From a governance perspective, it is remarkable the intensive way in which such EU tools were promoted in the regional context. For example, in the case of the peer-review event in Heraklion, our observation research (through our participation in the event) can confirm a wide participation of diverse entrepreneurial actors (firms, development agencies, public authorities, academia, intermediaries etc), which show an increased policy enthusiasm for the emerging S3 framework, probably due to the S3 *ex-ante* conditionality, imposed by the EU.

7.3 PART B: New governance and institutional reforms for smart specialisation strategies in Crete and CM

In this second section, we investigate the way in which new governance and institutional reforms affect the implementation of smart specialisation in the two regions. This section refers to the second part of RQ2. Specifically, we intend to study how new ways of smart specialisation governance improve S3 practices in Crete and CM and, simultaneously, examine what specific reforms in institutions might be necessary to make these governance improvements. To meet the second objective of RQ2, the analysis of the findings was based on data collection from the first round of interviews (see indicative questions 27-31 in Appendices Table 6), as well as on data gathered during longitudinal research in the region of Crete (see Appendices Table 7 for guidance).

7.3.1 Mapping the need for new governance and institutional arrangements towards S3

Despite the recent progress made in integrating the governance of smart specialisation in Crete and CM, there is a clear view in the responses reflecting the belief that both regions need a series of governance improvements to maximise the results of smart specialisation implementation. In particular, the idea of improving existing governance schemes and reforming institutions to assist S3 development, has

been recorded in diverse ways in 41 out of 50 responses, covering a wide range of representativeness in both regional environments. We present two indicative quotes, one from each regional environment which show how this need is expressed in the words of the respondents:

We need an effective governance model to support smart specialisation which is currently missing from our region (PECM26, 2015)

The region should find a mechanism which will enable the design of RIS3 policies and actions and ensure an effective implementation, monitoring and assessment (OICr3, 2014)

The analysis of these quotes can be based on the discussion of two key elements. On the one hand, governance conditions and institutions currently regulating S3 practices require further modifications in order to enable a productive realisation of smart specialisation. This is a clear finding. On the other hand, the capacity and readiness of the local entrepreneurial actors to induce, adopt and implement these modifications are relatively weak, particularly at times of economic austerity (the aspect of capacity building is evidenced and discussed analytically in chapter 8). As to the first element, the key finding is that the existing governance and institutional mechanisms of S3 are still inadequate to support the implementation of S3 in Crete and CM. Examples of inefficiencies in S3 governance are found at the regional, national and EU levels discussed briefly in the following sections. In this respect, the key point is to investigate empirically what governance improvements, at what administrative levels and in what institutional manners could gradually initiate a more effective development and co-ordination of S3 in the case study regions. In the following sections we study these interesting aspects analytically.

7.3.2 Governance reforms, changes and adjustments for smart specialisation strategies

Our analysis identifies and discusses the need for introducing four new ways of governance transformation. Transformation, in this study, takes the form of any possible reform, change or adjustment that innovation policy governance may take. Table 7.3 summarises the number of the interview responses on each policy governance reform, change and adjustment. We used keywords and specific ideas and concepts from the data to create four meta-categories of meaning. Despite the practical difficulty in predicting the effects of this governance transformation in advance, each type of transformation is seen by the respondents as an important part of the re-configuration needed to gradually build a new more effective smart specialisation governance framework in both regions.

Table 7.3 Number of responses on S3 governance transformation

Governance transformation	No. of respondents			Percentage ^(*)		
	Crete	CM	TOTAL	Crete	CM	TOTAL
Changing autonomy and flexibility levels in regional policy governance	13	9	22	43.3%	45.0%	44.0%
Adjustments to simplify the governance of smart specialisation related practices	18	11	29	60.0%	55.0%	58.0%
Governance reforms in public administration collaboration	22	9	31	73.3%	45.0%	62.0%
Policy governance adjustments to accumulate critical mass	18	12	30	60.0%	60.0%	60.0%

^(*)Based on a total number of 50 interviews: Crete=30, CM=20

Source: Author

7.3.2.1 Changing autonomy and flexibility levels in regional policy governance

A first change in the governance of S3 is the provision of additional administrative autonomy in regional innovation policymaking and action. Evidence from the data suggests that additional administrative autonomy is linked to additional

flexibility in the way regional innovation strategies are governed and regulated by public-sector agencies. The idea of giving regions greater flexibility to govern and regulate the development of S3, was raised from a systematic endeavour to understand whether changes in policy governance autonomy are possible to affect S3 development. Interestingly, we found 22 responses (out of 50 interviews) showing that the provision of more administrative flexibility in the way in which regions govern their innovation strategies can be seen as a key S3 enabler, suitable to overcome specific practical implementation challenges. For example, interview responses from longitudinal research indicate that regional public-sector agencies are flexible to regulate the design of S3, but they are not administratively independent to implement it, given the governance domination of the central state and the strict policy regulations enforced by the EU (see following section). The state and European domination in regulating S3 on the one, and the limited power of the regions to govern the implementation S3 on the other, is described in the following quote provided by a Cretan S3 co-ordinator:

You are allowed to design, you are given the option to select, but in the implementation stage a bottleneck appears as you have to conform with national and European bureaucratic regulations or rules, emerging from the fiscal consolidation imposed by TROIKA¹¹ (KACr47, 2017)

This quote shows a key barrier to S3 implementation, caused by the fact that an important part of the S3 governance does not take place at a regional but also at a national and European level. Arguably, this view reveals the need for additional policy governance autonomy at the regional level. Simultaneously, the idea emerges that in order to make S3 implementation more effective, it is critical to find a state of equilibrium between regional policy governance autonomy and central authority (which obviously cannot be entirely eclipsed). A precise identification of this

¹¹ In the context of the European-Greek crisis, the Troika includes: the European Commission (EC), the European Central Bank (ECB) and the International Monetary Fund (IMF).

equilibrium, however, is by no means a simple process, given the complexity in predicting the effects of changing part of the policy governance routines and practices at several administrative levels. This challenge raises a number of interesting questions. For example, what adjustments and to what extent should be made to increase autonomy in S3 governance? To what extent these adjustments can increase regional governance autonomy to impact S3 development? How can an extended and perhaps unnecessary self-autonomy in S3 policy governance be avoided? In what ways can a desired balance of policy governance autonomy be achieved between regional and national levels?

To provide an analytical answer to these questions, a main stream in the responses indicates that adjustments, reforms and changes in regional governance autonomy need to be made gradually, based on a learning-by-doing approach. Specifically, it is proposed that the extent to which S3 policy governance should be independent from central and EU policy intervention on the one, and its possible impact on S3 development on the other, could be better predicted if they are tested in certain selected domains of S3 at a pilot basis (e.g. in the tourism complex). An representative extract showing this view is given by a Cretan respondent:

Achieving regional autonomy is of great importance and I would start regional decentralisation with some specific areas at a pilot basis. We can't do this for everything, because it will be a mess. It would be good to give autonomy to one or two sectors at a pilot basis to test if it works properly (AZCr6, 2014)

The emerging idea from this excerpt is that since decentralisation and self-governance at the sub-national level require large-scale institutional reforms (Baier, Kroll, and Zenker 2013a), empowering gradually regional policy governance options in pre-selected S3 domains would be an ideal option to test the extent to which the existing regional structures are appropriate to support self-development efforts. Undoubtedly, the idea of testing region's efficiency and ability for policy self-governance is a new way

of thinking and addressing regional innovation governance in Crete and CM, which goes beyond previous policy routines and practices. This approach to policy governance is new in regional innovation, in the sense that it includes co-ordinated and collective steps for gradual and experimental development.

7.3.2.2 Adjustments to simplify the governance of smart specialisation related practices

A second important change in the governance of S3 is the simplification of certain policy processes which are related to different developmental stages of smart specialisation. This outcome derives from the analysis of 29 responses which suggest that a number of procedures and structures currently governed and regulated in the context of S3, are complex and time-consuming, raising policy uncertainty and weakening the reliability of S3 as an appealing innovation policy tool. This uncertainty increases the need to simplify the way in which S3 is presently governed, by reducing the complexity of specific processes and by increasing their functionality. This need was more obvious in the data collected from the region of Crete during longitudinal research, in which 9 out of 10 respondents marked this need as a high priority particularly for the implementation phase of S3. One can assume that this was due to the fact that when longitudinal fieldwork was carried out (summer of 2017), the implementation of S3 was already under way and its practical challenges were more evident. The datasets include a number of examples which show how the restructuring of specific procedures governing the implementation of S3 can lead to better policy outcomes. Three examples of policy governance complexity which need to be rethought and reconfigured in a more simplified way to bring S3 governance integration in Crete and CM are discussed below.

Local cases of S3 governance transformation

- i. The case of the State Aid Information System*

The case of the State Aid Information System is a representative example that displays the difficulty of governing smart specialisation practices due to extensive bureaucracy and complexity in regulatory processes. This system constitutes the main centrally-designed mechanism which is placed to monitor and control any state aid action, including a range of procedures related to S3. In practice, it is the official public sector mechanism which governs the interaction between regional and national authorities as to what S3 projects will be approved and funded as well as under what specific conditions. The key point with the State Aid Information System is that it is not the system itself which raises regulatory complexity and policy uncertainty, but a series of bureaucratic rules which have been enforced by the national government to govern its function. Cretan and Central Macedonian S3 co-ordinators from the public administration sector (with a direct engagement to the system), mention that the regional-national cooperation under this governance scheme is not appropriate to deliver flexibility and fast-track services, increasing the possibility for creating significant delays in approving and funding S3 projects. This is a key governance barrier to S3 implementation in the sense that it is not the system-tool itself which raises uncertainty, but the way it is currently used and regulated by the regional and national authorities (e.g. lots of paperwork and open time-consuming procedures that are supposed to ensure transparency). Indicative quotes which show how the case of the State Aid Information System is possible to affect S3 development in Crete and CM is captured in the respondents' words from each region:

There might be potential risks from the usage of the State Aid Information System, which is very slow. Previous experience showed that this system is very slow, and I see that this may be a big obstacle for RIS3. For example, we may be ready as a region to publish a S3 call, but the system won't be ready to make the evaluation [...] the system is obligatory from the Commission, which is about right, but it seems that we've got a system with many problems (DACr44, 2017)

An important barrier particularly for the implementation of smart specialisation is the difficulties due the long delays and bureaucratic processes emerged from the PSKE¹². The PSKE delays and complicates the implementation phase (KOCM25, 2015)

The above quotes show that speeding up the procedures of approving and financing S3 projects at the sub-national level is only one part of the process, as approvals and other related actions are required at the national level. The example of the State Aid Information System reveals the need to rethink and re-build the governance mechanisms which are currently available for policymaking, with the aim of reconciling national and regional administrative power for further flexibility to S3.

ii. Regional policy, trapped in European and national mechanisms: the case of state aid rules

This challenge relates to the new state aid policy imposed by the national and EU governance regulations. As shown in the following citation from a Cretan S3 coordinator, a number of strict rules that several state aid programs have lately incorporated to deliver additional transparency when publishing new calls for tenders, act as an important prohibiting factor to stimulate private actors' engagement (e.g. administrative processes increase implementation complexity due to loads of paperwork to approve and disburse instalments, bureaucratic and out-of-date normative regimes at the national level). Moreover, it is argued that the new regulations, mainly coming from the EU, as a mechanism to control European funds, seem to affect negatively the attractiveness of the new innovation support programs and, therefore, the participation of several beneficiaries, particularly from the private sector. An indicative excerpt is presented below:

The regulations of the new programming period introduce a number of rules which possess limitations. As an example, I would like to mention the state aid rules for innovation actions which raise bureaucracy and

¹² *State Aid Information System*

policymaking difficulties in attracting beneficiaries through the new calls for tenders (KACr47, 2017)

This particular case highlights the dysfunctionality of this control mechanism, that the EU has imposed to control funding and ensure accountability and accountability, to facilitate S3 practices and ensure an effective participation of the private sector in the development of smart specialisation.

iii. National conditionality limitations

This challenge refers to the so-called national conditionality framework which introduces new directives and regulations in the ongoing programming period. Particularly, the national government has to approve and fulfil a set of conditionalities under the EU structural adjustment programme in order to eliminate several existing obstacles and harmonise its national policies with diverse EU 2020 regulations. KACr40, (2016) explains this process by discussing the example of the digital agenda. Moreover, the EU digital agenda is part of the Europe 2020 strategy aiming at "developing a digital single market in order to generate smart, sustainable and inclusive growth in Europe" (EC 2014a, 3). The process of fulfilling the conditionality of the national digital shows the difficulty of the regions to proceed with smart specialisation due to the delay of the central government to align the conditions of the national digital agenda with the EU standards. Practically, the EU authorities expect from the Greek regions to adapt their smart specialisation plans according to the EU regulations, whilst the national government has not yet fully embedded them in its strategic planning. This contradiction raised legal policy implementation conflicts among national and regional actors, leading to important delays. With regard to this challenge, KACr47 (2017) says:

We can't really proceed with RIS3; we can't do anything until the central government settles all appropriate requirements related with the ex-ante conditionalities that the EU has set in respect of the smart specialisation strategies (KACr40, 2016)

Practically speaking, the launching of S3 was depended on the ability or even the political priority or will of the national government to urge specific political institutions aligning part of the national legislation with the EU regulations and standards. This suggests that while local authorities are supposed to design and make sense of their own regional innovation plans, a series of national-level governance inefficiencies represent an essential bottleneck for the implementation of S3 at the regional level. The example of the national conditionality (e.g. the enforcement of EU regulations) shows clearly the dominance of third national and EU bodies on regional development and reveals the need for additional regional autonomy and flexibility in innovation policymaking as discussed in following sections.

Interestingly, we saw that it is not only the policy governance mechanisms directly related to S3 that are proposed for review and re-design, but also other complementary to S3 actions that must be changed and improved at both the regional and national level. Moreover, the data shows cases in which a range of policy governance inefficiencies have affected the implementation of S3 in the sense that important barriers and delays were caused, delivering complexity and uncertainty in policy action. An example which is highlighted in the data and indicates the need to consider and make governance adjustments well-beyond the strict policy borders of S3 is discussed below.

iv. Simplifying recruitment processes for S3 development

The difficulty of recruiting new experts appropriate to run S3 is indicated by the public sector respondents as an example of governance ineffectiveness, which currently hampers the realisation of S3. In this respect, the existing governance regulations cause inertia in public recruitment. In particular, provided that smart specialisation has been introduced as a regional innovation tool for the first time in both regions, and that regional authorities are understaffed without an adequate

number of experienced policymakers to address S3 challenges, the need for introducing a series of governance modifications to simplify recruitment becomes an imperative. In respect to this necessity, a Cretan policymaker mentions:

We don't only have to tackle bureaucracy related directly to RIS3, but also administrative bureaucracy which relates to other types of policy action and support. For example, I want to hire five experienced people that will be able to run RIS3 without following the national procedures of ASEP¹³. ASEP is an obstacle itself, because I want to hire these people immediately, not in six or twelve months from now (KACr48, 2017).

In a similar manner, another respondent from the Cretan public sector highlights the fact that regional authorities lack an adequate number of experienced human capital to support the development of S3:

The truth is that we don't have adequate human resources, personnel with expertise. You really need to have a new human capital, people who can understand what innovation or entrepreneurship are, we don't have such a human capital at present (KACr42, 2017)

Both quotes indicate the lack of an adequate number of appropriate staff and the need to modernise public-sector recruitment for the purpose of S3. In this respect, some respondents suggest that modernisation of public sector governance structures needs to include a variety of changes towards achieving fast and less bureaucratic administrative processes. This procedure requires key modifications in the existing systems of public sector recruitment which will bring efficiency, flexibility, accountability and transparency.

¹³ ASEP is the Greek Supreme Council for Civil Personnel Selection established by Law 2190/1994 as an independent authority responsible for securing the implementation of the provisions on public sector staff selection and recruitment (source: www.asep.gr)

7.3.2.3 Governance reforms in public administration collaboration

A third change in respect to S3 governance is pinpointed by the data which suggest that a series of policy adjustments that public sector organisations are needed to improve national-regional collaboration. Despite the progress discussed in section 7.2.3.1, the respondents emphasise that the existing S3 governance model needs additional modifications, as it still lacks clear directions of the way in which bottom-up and top down S3 approaches could be better reconciled and governed. For example, we have captured eight individual responses which point out that although a series of S3 national tools were introduced to support the governance of S3 (e.g. the national council, national innovation platforms), their co-operation and support at the sub-national level is still limited and unknown, raising collaborative and administrative barriers (e.g. who is doing what, unclear tasks, problems with time schedules). To show the uncertainty currently surrounding the co-operation at a national-regional level in the context of S3, an innovation expert from the Alexander Innovation Zone of Thessaloniki reveals:

At present everyone is responsible for everything and at the end of the day nothing has been achieved. We need clear responsibilities and tasks for everyone (TRCM35, 2015)

In the same vein, supporting the argument that the existing S3 regulatory governance includes levels of vagueness, SOCM37 (2015) says:

The role of GSRT¹⁴ on S3 is absolutely unclear. At present, we don't know if GSRT is the responsible authority to co-ordinate and supervise the development of S3, there are not any clear guidelines on this issue. Typically, GSRT is responsible for the whole co-ordination of the regional innovation strategies, but is this also applicable in the case of S3? We don't know (SOCM37, 2015)

¹⁴ General Secretariat of Research and Technology (GSRT)

While the collaboration and interaction of key S3 actors is increasingly important to take place at a national-regional level, the above citations indicate weaknesses in the way in which institutional communication is currently taking place between national and regional authorities for the development of S3. To overcome this challenge, a series of adjustments are suggested in the responses. For example, the national and regional entities responsible for the development of S3 need to institute a permanent collaborative dialogue to examine more closely how a series of new regional and national tools introduced for the purpose of S3 could be better governed to promote S3 (e.g. the innovation platforms, the national S3 council, the Regional Scientific Councils for Research & Innovation, see section 7.2.3.3). This view is supported by 22 out of 31 responses, which promote the idea that a first step has been made already through the creation and institutionalisation of these policy tools, but what is now necessary is to ensure their functionality in the sense that they promote synergies and they do not operate in isolation. In this regard, what is required from a policy governance perspective is not the introduction of additional policy instruments, but the substantial exploitation and governance of these tools. Therefore, a clear and comprehensive direction of how these institutional tools will function towards S3 would be shaped by new more intensive and frequent interactions among public sector regional and national smart specialisation actors.

7.3.2.4 Policy governance adjustments to accumulate critical mass

The data evidence one further requirement. S3 governance change is related to policy adjustments which are needed to secure private firms critical mass. Precisely, when we looked for smart specialisation enablers in Crete and CM, more than half of the respondents (30 out of 50) pointed out that S3 implementation needs to be governed towards identifying, engaging and favouring the interaction of a large number of private sector beneficiaries, reaching an adequate critical mass from the

business community. This need is articulated in the following quote, provided by a public sector respondent from CM:

We need to see how to favour more beneficiaries through our policies and strategies. We should look for a wide participation of private actors, and we should build a proper control mechanism to support these actors implement their smart specialisation strategies (KOCM18, 2015)

In chapter 6, we saw that the participation of the private sector in the entrepreneurial discovery was relatively low in the sense that only a small number of firms and entrepreneurs have been directly involved in the discovery process (private sector was broadly represented through chambers, business associations and other similar intermediaries). Firms critical mass, however, and particularly the direct engagement of local entrepreneurs (under the narrow meaning of making business) is a key success factor to drive the entrepreneurial discovery successfully (Gianelle et al. 2016; McCann, van Oort, and Goddard 2016), given that it is the entrepreneur itself who must lead the entrepreneurial searches (Foray 2014). The mobilisation and engagement of a broad participation of diverse entrepreneurial firms in which smaller firms, and possibly less-innovative, will also have a role to play in the process of discovery is captured also in the findings. For example, KOCM25 (2015) says:

The logic of the region is that everyone is welcome to have an active role in the smart specialisation. Apart from the giants, regional innovation systems include also less innovative firms. We want to attract best innovation performers to start smart specialisation strategies, and then other firms, less innovative, can start engaging and participating (KOCM25, 2015)

To determine what policy governance adjustments could support the mobilisation and engagement of S3 beneficiaries in the case study regions, we run specific queries in NVivo. In a total number of 30 responses, the respondents suggest that the key point is

to make changes in the way firms are reached and encouraged to take an active role in the design and implementation of regional innovation strategies. In previous innovation policy frameworks, most of the public sector initiatives which aimed at promoting private sector commitment, were based on the identification and engagement of single firms, usually knowledge-based firms and large companies. While this practice might be successful and beneficial for a small number of entrepreneurial actors, it is by far inappropriate within the smart specialisation rationale, which promotes public-private sector synergies in a more intensive and collective way comparing to previous endeavours.

Since smart specialisation funding will be mostly provided to private-public actions (Region of Crete 2015; Region of CM 2015), public-private synergies (e.g. industry-academia collaborations) are seen as an effective means of mobilising firms' participation in S3. Moreover, the traditional collaboration between private and public sector actors for innovation policymaking and action is and remains weak, in the sense that it is not conducted regularly and repeatedly. In total, 19 out of 30 respondents suggest changes through the design and provision of a new series of policy initiatives for the promotion of public-private collaborations. As opposed to earlier efforts, we found that these new initiatives are different in the sense that they are designed to promote cross-sector collaborations at a permanent basis (e.g. support the creation of clusters and agglomerations), with the aim of supporting a large number of dissimilar firms improve their innovation capabilities (firms' innovation capacity is discussed analytically in chapter 8). The logic behind this idea is to constantly promote collaborative and systemic innovation, so that to provide equal opportunities not only for the local champions or leaders, but also for many other regional firms with less innovative capacities to participate in the development of S3. Through this process, the latter will benefit from tailor-made support and follow an imitation-to-innovation route (Kim 1997) to catch up with more advanced firms. We show an interview extract from a private expert from the Business and Cultural development Centre of CM:

It's not good to take only the best innovators, the regional champions, you need also to consider the engagement of other businesses. It's good for S3 to support average-level companies catch up with the top leaders. And you will never be blamed that you selected again the usual suspects. So, different companies should be engaged in S3, but with a different strategic approach. You can't just go for everyone with the same strategy, you need to make a decision and it's crucial to see how this decision could mobilise companies innovate more (KACM32, 2015)

7.3.3 Reforming and adapting institutions for smart specialisation governance

The importance of building a strong and stable institutional environment for innovation policymaking was highlighted in the introduction of this chapter, by acknowledging that economic development depends upon the existence of well-established institutions (North 1990). However, despite the recognised role of institutions as innovation enablers (Edquist 2005; Strambach 2010), critical questions remained to be answered in the S3 context, regarding the implications of institutional integration and diversity on S3 (Grillitsch 2015). For example, how can institutions impact the realisation of S3 in practice? In particular, how can certain institutional changes, reforms or adjustments favour a more productive governance transformation discussed above? The answers to these questions are not straightforward, given the abstract nature of institutional theory and the difficulty of measuring institutions and their long-term effectiveness (Rodríguez-Pose 2013). To this end, this section aims at addressing these contemporary questions by studying the importance of integrating both formal and informal institutions for the development of S3. It uses empirical evidence to show what institutional reconfiguration is needed to support the governance of smart specialisation strategies in Crete and CM.

In general, we found that in the Cretan and CM context, the enacting and enforcing of new institutional arrangements is dependent on four critical factors which require a set of responsive legislative changes. Table 7.4 summarises the interview responses regarding what types of new institutional arrangements are possible to

affect S3 implementation in the case study regions. Each of these aspects of institutional integration is discussed analytically in the following parts.

Table 7.4 Number of responses on institutional reforms for smart specialisation governance

Types of institutional reforms	No. of respondents			Percentage ^(*)		
	Crete	CM	TOTAL	Crete	CM	TOTAL
Public sector reforms to reduce institutional uncertainty and administrative burden	17	12	29	56.7%	60.0%	58.0%
Increasing regional self-government and autonomy	19	11	30	63.3%	55.0%	60.0%
Implementation and enforcement of legislation	9	7	16	30.0%	35.0%	32.0%
Regional restructuring for smart specialisation	3	6	9	10.0%	30.0%	18.0%

^(*)Based on a total number of 50 interviews: Crete=30, CM=20

Source: Author

7.3.3.1 Public sector reforms to reduce institutional uncertainty and administrative burden

Bureaucracy or other administrative uncertainty emerging from ineffective norms and routines are an important part of the institutional setting of a territory (North 1989). The importance of institutional bureaucracy has been evidenced in the data which highlight the need of institutional re-configuration to be oriented towards examining how state bureaucracy and administrative burden can be progressively reduced to tackle institutional uncertainty and facilitate S3. In previous sections, we discussed the need to simplify certain policy processes which are related to S3 governance. In the analysis, we find that this simplification depends highly on the ability of the public sector administration to induce structural change and improve its functionality. Moreover, the view that existing institutions strangle the implementation of S3 in the sense that they are not innovation-policy friendly and supportive, e.g. they

include time consuming process, massive paper work, red tape, public trust problems, implementation uncertainty etc, was reported by 29 respondents. They evidence the administrative inefficiency of public sector as a significant barrier to S3 implementation. The words of a Cretan respondent are indicative:

Fearing corruption, we have made a very cumbersome and complex administrative system (DACr44, 2017)

There is an emerging necessity to review and integrate the current institutional framework with the objective of improving the functionality of public sector administration to favour the implementation of smart specialisation. This necessity is reflected in the following quotes:

Bureaucracy seems to be a hurdle to innovate, particularly for new start-up ventures, so you need to rethink the existing institutional framework, it will need proper adjustments to reduce bureaucracy, and I think this is a necessity if we want to attract private funds for S3 investments (FRCr17, 2015)

Bureaucracy surrounding RIS3 practices is huge and acts as an important inhibiting factor for implementing RIS3 projects on-time due to operational and institutional barriers (KACr40, 2016)

Furthermore, both quotes underline the need to reduce public bureaucracy and administrative barriers, derived from a poor institutional environment, currently governing the operation of public administration at the regional level. In chapters 6, we indicated a number of institutional barriers in public administration processes, including the ineffective co-ordination among governmental authorities at the national and sub-national levels, lack of public trust and limited interaction among private-public sectors. There is widespread acceptance in the data that, administrative burden reduction and recovery of institutional uncertainty, imply changes in public-sector

administration. This is clear in the findings. What is not clear though, is what institutional changes are particularly relevant to increase the administrative efficiency of each public sector unit which may have an impact on S3 development. Given the different organisational structures, responsibilities, needs and capacities that each public sector organisation may possess, an analytical answer to this question is not possible, unless a new empirical investigation, well beyond the boundaries of this thesis, is exclusively dedicated to this end.

The case of the Directorate of Transport and Communications in Crete

An interesting example emerging from the Cretan case study, which shows how endogenous public sector reforms could bring further institutional integration and additional governance simplification, is the restructuring of the Directorate of Transport and Communications (DTC), which has been transformed from a deep bureaucratic structure to a very modernised public organisation. By reforming many of its institutional operations (e.g. digitisation of records and services, e-services for citizens etc), the DTC reduced bureaucracy and got the second regional award from the European Public Sector Award 2017¹⁵. The public sector respondents from Crete indicate that the DTC is an ideal example of institutional change whose rationale could be adopted, adapted and applied in other similar initiatives of changing public administration as a good practice. A Cretan respondent with a key role in the modernisation of the DTC points out:

The modernisation of the Directorate of Transport is a good example of how specific institutional reforms in the existing operation of a public sector organisation, for example, the introduction of e-Governance, reduced bureaucracy and led to additional administrative flexibility and fast-track services for the citizens. It works well, and we should do it to other public sector units (RACr4, 2014)

¹⁵ Source: EPSA Best Practices & first results, <https://epsa2017.eu/en/content/EPsa-first-results.54>

We do not use the DTC case to understand how institutional change comes about. Besides, the DTC example does not really explain the mechanism by which change in public administration processes may take place. However, what the DTC case shows is that since it is not possible to induce institutional change in a universal way to assist S3 governance (efficient institutional adjustments in one organisation does not necessarily mean the same for another organisation), it is of great importance to perform a step-by-step investigation, in which institutional reforms can be examined and nominated separately for each public sector actor who has a key role in the development of S3. This process will help to endogenously change part of the institutional rules currently governing the implementation of S3.

7.3.3.2 Increasing regional self-government and autonomy

A total number of 30 respondents regard the reforms which are intended to increase institutional autonomy at the regional level as a new indispensable element of governing smart specialisation strategies in the regional setting. In particular, this autonomy refers to the provision of additional institutional power to regions, with the objective of increasing their independence from the central state and raise the levels of self-governance in innovation policy making. To highlight the need for far-reaching institutional reforms, aimed at strengthening further regions' policy independence for innovation policymaking, RACr4 (2014) says:

It is not possible for every single decision we want to make, for every minor issue to wait for the ministry's approval, it doesn't work like this, it should be changed (RACr4, 2014)

This is an indicative extract which reveals regions' institutional limitation to develop innovation strategies in a productive way. There is a clear suggestion derived from the interview responses (19 responses from Crete and 11 responses from CM) that institutional reforms towards maximising regional self-government and autonomy have become increasingly crucial and must move towards specific directions to support an

effective governance of S3. Moreover, we found that reforms are needed to increase regions' power to legislate, by providing them with additional institutional authority to develop and enforce tailor-made development laws at the regional level. As an example, we refer to the respondents' view who promote the significance of tax reforms, by granting fiscal incentives at the sub-national level to foster private firms' participation in S3. The main idea is that it should be the region itself (and not the central state) which must be given the option to decide on tax politics to support its own developmental priorities in the context of S3; for instance, to choose what financial incentives should be given and to which economic domains. An example of how a change in the regional tax legislation might affect the implementation of S3 in the region of Crete is given by a local entrepreneur from the manufacturing sector:

A second measure to facilitate S3 development is to support economically isolated areas, just like Crete, to overcome the costs of transporting raw materials in order to remain competitive. So the regional government could have power to reduce transportation costs or to provide tax reduction to support local companies and help them remaining competitive globally (KOCr15, 2015)

This excerpt nominates a place-specific example as to how changes in regional institutional power (in this case increases in regions' legislative power for tax benefits in selected entrepreneurial priorities) may favour the realisation of S3. In this regard, we found that such legislative options and changes need to be place-specific, considering the particularities of the local economies (e.g. specific sectors and industries in which regional advantages exist) and, most importantly, the R&D domains which have been identified and selected during the entrepreneurial discovery for each region. The question to be answered, however, is to what extent Cretan and CM public sector authorities are ready to respond to these legislative changes. Similarly, what about their institutional capacity to embody part of this central-state power in their

operational routines and use it effectively in the context of S3. This interesting issue is examined and discussed analytically in the following chapter.

7.3.3.3 Implementation and enforcement of legislation

As a third reform, the respondents highlight the need to change the way in which institutions are currently implemented and enforced at both the regional and national level. Particularly, a total number of 16 interviewees have expressed directly the view that it is not only important to rethink and modify the existing institutional framework, but also to ensure that norms and laws are enforced effectively and rightfully. This finding is in line with previous research which draws attention to weak state capacity to induce and enforce new regulations and laws for policy development (Pritchett, Woolcock, and Andrews 2013). In this respect, the main idea is that change of improvement should not be necessarily in the institutions themselves, but in the way they are enforced by making it more rigorous, transparent and reliable. To show the importance not only of setting but also of enforcing proper institutions in building trust in innovation policymaking, ANCr11 (2015) points out:

Trust is crucial for smart specialisation practices, and it comes when the whole system works well, when institutions and regulations are effectively enforced. What I mean is that you cannot just put hundreds of strict laws to counter corruption and when you catch corruption just to show leniency and impunity, it won't work like this (ANCr11, 2015)

This quote recognises the value of institutions enforcement capacity in public policy and the need to induce changes towards this direction. We link institutions and legislation with S3 practices by acknowledging the difficulties emerged due to the inefficiency of the current legal framework to promote a stable, fair and trust-worthy environment for S3 beneficiaries. Moreover, in chapter 8 we will indicate the relatively high levels of corruption and the lack of public trust as two important barriers for the development of effective innovation policies, (e.g. more than half of the respondents

believe that the lack of trust-based relationships remains a key barrier for developing private-public linkages). This finding is closely related with the lack of public-private trust, which in its turn, composes an institutional barrier which blocks the productive implementation of innovation policymaking in the S3 context.

In the same vein, a local entrepreneur from the manufacturing sector highlights the problem of generating innovation and becoming competitive in a weak institutional environment, in which formal rules and regulatory policies are not working properly. He points out:

We are harmonised with the national norms and the European standards and we can innovative under these regulations, but this is not the case with many other competitors who are not comfort with these regulations but they can offer their products in low prices. So, we are talking about an unfair competition and it's a matter of inadequate control and monitoring institutional mechanisms (KOCr15, 2015)

He continues:

It's really important to have regional and national institutions that will be able to control and ensure that the private sector is in line with the existing legal framework. However, this is difficult because of the limited number of people working for the ministry, at least this is what they argue. So the state is unable to protect those companies which have decided to incorporate innovation and provide an actual added value to their products (KOCr15, 2015)

The words of this entrepreneur confirm an implementation challenge of the current regulation, which hinders entrepreneurial development and raises competition problems. In this sense, a set of regulatory adjustments that can embrace strong enforcement policies, appropriate to secure the enforcement of the rules is importantly missing.

7.3.3.4 Regional restructuring for smart specialisation (regional amalgamations)

This final section analyses data which underscore the importance of initiating a set of institutional changes to promote transformation of regional space for the purpose of S3. Particularly, we have collected responses from 9 interviewees who suggest that Crete and CM are two relatively small regions to implement smart specialisation (e.g. they have a small number of innovative firms) and that it would possibly bring more efficiency and better policy results if S3 has been designed and implemented in larger territories, beyond the NUTS2 level (e.g. neighbouring regions with common S3 priorities). This view promotes the idea of merging small regions for innovation policymaking and action to accumulate critical mass for the design and implementation of S3. An example of how geographic re-organisation could work in the S3 context is derived in the following quote, which suggests the production base of the regions as a criterion when considering territorial restructuring through mergers:

In the case of Greece which is a small country, you can't implement RIS3 in NUTS2 regions as they are too small with limited potential and different resources. For example, we can't really talk about RIS3 in Thessaly, in Epirus, or in Central Greece. RIS3 wouldn't be necessary to be conducted in administrative regions but in areas which have similar production profiles which may not be connected administratively. For example, why didn't we consider Thessaly and Central Greece as one common area for the purpose of RIS3? Why not design and implement RIS3 particularly for this grater area? West Macedonia for example could go together with Epirus to focus on power generation or on sectors which are pretty much related with the electric generation industry (XACM29, 2015)

This excerpt belongs to a local entrepreneur from the manufacturing sector, who promotes the idea of regional amalgamations on the assumption that Greek regions (at the NUTS2 level) are not self-sufficient to follow a systematic bottom-up approach to conduct an effective entrepreneurial discovery and facilitate place-based policy action within the S3 framework. We recall that Greece is divided into 13 administrative

regions at the NUTS2 level and 7 decentralised regions (see figure 1 in Appendices for guidance). This view suggests radical changes in the regional geopolitical dynamics and, as such, it requires political will and power, as well as a series of co-ordinated actions at both the national and regional administrative levels. Under this idea, adjustments in the regional landscape implies territorial restructuring for policy reorientation and regional renewal, which is almost certain that it will include significant conflict among and within regional and national stakeholder groups.

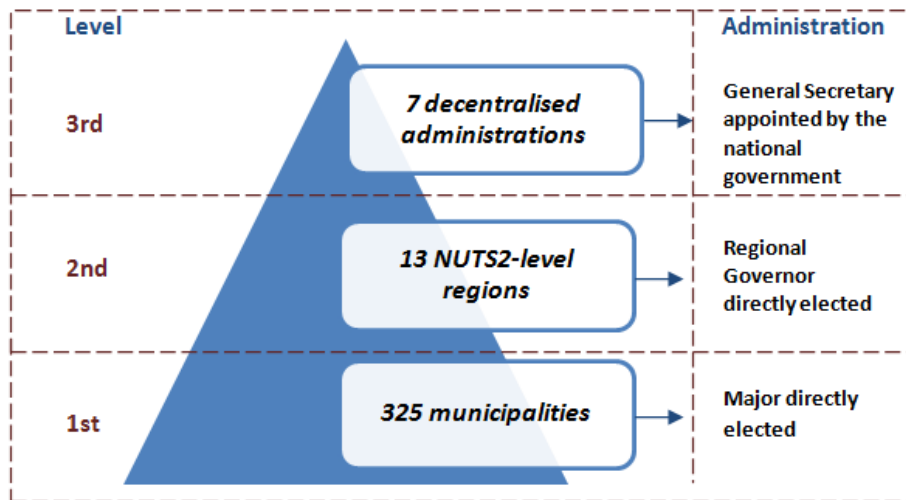
The roots of regional regrouping for smart specialisation policymaking

The idea of regional regrouping and restructuring for policymaking as indicated in the responses is linked with a series of efforts conducted lately by the national government to restart the national economy. OECD (2017a) identifies four major drivers of territorial reforms: political change; demographic change; socio-economic change; and local management and finance. In the case of Crete and CM, the idea of territorial reform is more likely to include political and socio-economic reasons. Moreover, since the 2008 economic crisis, Greece attempted significant efforts for structural reform and renewal with the objective of reducing governmental spending, increasing administrative efficacy and facilitating the rationalisation and modernisation of the entire public sector. The *Kallikratis Plan*¹⁶, approved by the Greek parliament in 2010, was possibly one of the most ambitious efforts to reform Greek local government by providing the public sector with more flexibility, autonomy and transparency. In practice, its aim was to reduce the number of municipalities from 1.034 to 325, abolish 54 prefectures and 19 provinces, and introduce the new concept of the decentralised administrations where the 13 NUTS2 territories were administratively replaced by 7 decentralised regions, (Fujita 2013). Under the new Kallikratis Plan, which came into force on January 1, 2011, the Greek local government consists of the 325 new municipalities (first tier level), 13 NUTS2-level regions (second tier level) and 7

¹⁶ The Kallikratis Plan is fully described in the new Greek Law 3852/2010 (FEK 87A'/ 2010)

decentralised administrations (third tier level). The new local administrative system of Greece is fully illustrated in Figure 7.1.

Figure 7.1 The new local administrative system of Greece



Source: Author

As shown above, the decentralised regions are administered by the General Secretary, appointed directly by the national government, and an advisory council consisting of the regional governors and the representatives of the municipalities. At the second level, regions are administered by the regional governor and the vice-regional governors which are responsible for the regional units; both are elected directly by local citizens. The third level of administration, composed of the new municipalities, is run by the majors and their municipal councils which are also directly elected. This new local government structure was created to provide more power and autonomy to the Greek regions in order to design and adjust their own regional strategic frameworks according to the national legislation and the EU cohesion policy. In reality, it could be treated as the first serious step of the national government to restructure its operations and devolve part of its mandate and political legitimacy to the regional governors. On the contrary, it is worth noting that in the case of the decentralised regions, where one could expect more STI flexibility and authority at the sub-national

level, the political power and decision-making remain both at the central government (Fujita 2013).

Though the respondents mention that it is not necessarily the case for Crete and CM, it may be useful to rethink territorial restructuring and promote the idea of strategies' combination for the purpose of S3 particularly, based on the place-adaptive rationale of Kallikratis Plan. A number of proposals are found in the data, suggesting specific territorial patterns for new geopolitical policy action. We present two indicative quotes from CM interviewees:

I would put Central Macedonia with Eastern Macedonia Thrace and Western Macedonia with Epirus together, it would make more sense, and in general, I think it would bring better results in the regional innovation policymaking, and this is because Greek regions are too small in terms of size (MPCM34, 2015)

My personal opinion is that it would be useful to have larger regions for the development of S3 in order to achieve critical mass. However, I don't think that this will happen in practice because of politics (TRCM35, 2015)

As discussed in chapter 5 (see background of the regions in section 5.2), Greece is a small EU country with an economically weak periphery at the NUTS2 level. Therefore, the main idea derived from the above quotes is that Greece consists of small-scale sub-national ecosystems which may be unable to fully combine the essential elements for the transformation of smart specialisation theory into practice. The claims of this argument rely primarily upon three main views expressed by the respondents: first, the majority of the innovation systems at the NUTS2-level are very small in size, and therefore, unable to reach the appropriate critical mass in research, innovation and entrepreneurship. This idea has been also introduced in the recent innovation literature by other empirical studies, see for example (Landabaso, Georghiou, et al. 2014), who stressed the importance of securing an active participation of a large number of local entrepreneurial actors. Second, they have weak structures and limited

financial resources to fully support S3 action plans (see chapter 5, sections 5.3 and 5.4 which analyse the industrial and innovation potential of each region); and third, the existing micro and meso-level capabilities at the operational and political level may be too weak to secure a successful design and implementation of the entrepreneurial discovery (this sections is evidenced and discussed in the following chapter).

It is worth noting that the scenario of using Kallikratis Plan for the development of S3, requires the initiation of large-scale structural reforms at the administrative level, as well as the enhancement of political will and actual intention for changing part of the existing political regime at both a national and sub-national level. Additionally, while we have not investigated it in great detail, we also assume that merger reforms will need a careful consideration of the criteria to be selected for partnering regions to support S3 implementation (e.g. geographical and knowledge proximity, homogeneity of industrial sectors and complementarities of specialisation, history, tradition and regional routines, political will for reforms and policy modernisation etc).

7.4 Conclusions

Chapter 7 aimed at providing an analytical answer to RQ2: *"How do, and can, institutional arrangements and governance reforms impact on smart specialisation practices"*. Its objective was twofold. First, to provide a detailed analysis of what governance and institutional reforms are currently taking place in the regions of Crete and CM to support the development of S3. Second, to investigate what new ways of policy governance are relevant to assist smart specialisation in both regions, and examine what institutional adjustments might be necessary to facilitate their deployment. To identify and understand changes in the governance of S3 and meet, therefore, the first objective of RQ2, a brief analysis was performed, introducing the way in which previous generation of regional innovation frameworks were governed. On the whole, chapter 7 draws attention to four key conclusions.

A first conclusion is the inefficiency of previous innovation policy frameworks to govern development strategies at the regional level. We saw that governance priorities of earlier innovation frameworks retained local players' involvement at very low levels, contradicting the principles of any contemporary regional innovation strategy which promotes bottom-up approaches. Our analysis revealed a *design nationally, execute regionally* governance model, in which a direct and continual engagement of local entrepreneurial actors was absent to lead the design of innovation policymaking at the regional level.

A second conclusion is that many of these previous policy governance practices are changing at present along with the development of the new S3 framework. This ongoing change in innovation policy governance is evidenced to take currently three different forms with place-specific effects on the implementation of S3 in Crete and CM.

The first form of change is illustrated through the emergence of a new public administration attitude as to how new regional innovation strategies are governed and regulated in the context of S3. We showed that this new perception to innovation policy, shifts from previous administrative practices and routines (e.g. design nationally, execute regionally) to new governance ideas and patterns that are more consistent to what smart specialisation theory is currently proposing. Specifically, we highlighted that under this new policy governance approach, Crete and CM are further encouraged to follow bottom-up practices (not only during the implementation but also during the design phase), and exploit opportunities for self-searching and learning. We used data to show that this change in policy governance attitude was more profound in the public administration sector, lying on the acceptance that additional governance power is given to regions for locally-designed action in innovation policies. The second form of change refers to the way in which S3 practices were approached and carried out by both regions. The data showed how under this new way, innovation policymaking was favoured further in the sense that policy governance actions were

conducted in a clearly more intensive and collective way comparing to previous policy efforts which lacked connectivity and systemic approaches.

Last, we found that the regulatory and administrative change to S3 governance discussed above, was supported by the transformation of several policy tools and unofficial governance shapes to formal and permanent institutional structures of policy making (e.g. the regional innovation councils). Interestingly, we showed that it was not the tools themselves that favoured the way in which S3 practices were governed, but the institutionalisation of these tools which empowered the practice of S3 governance.

A third key conclusion of this chapter is that despite the recent progress in integrating the regulation of S3 in Crete and CM, a series of new governance and institutional reforms are still needed to favour and improve S3 development. Four key governance reforms have been evidenced in the case of the selected regions.

A first reform is to change autonomy levels in regional policy governance with the objective of giving further flexibility to the implementation of S3. For example, we saw that public-sector agencies were capable to govern the design of S3, but less administratively independent to implement it. However, we noticed that these kinds of reforms face serious challenges. Moreover, we saw that the extent to which it will be successful, depends on a state will to provide regional public-sector authorities with additional administrative flexibility to manage the implementation of innovation strategies in the context of S3. Given the apparent difficulty to move policy power from national to regional levels, the Cretan and CM case provides place-specific policy suggestions as to how efforts to overcome the difficulties of changing the equilibrium between regional policy governance autonomy and central authority can work in practice. Specifically, through the case studies we showed that the required regional autonomy in governing S3 can be gradually achieved through a learning-by-doing approach, followed by a learning-by-evaluating process (Rodrik 2004b). In these approaches, the extent to which S3 governance can be semi-independent from central domination can be specified by selecting and testing regions' self-efficiency in specific

S3 domains. This process is based on pilot testing which goes beyond previous 'business as usual' practices in innovation policy governance in the selected regions.

A second essential change in S3 governance is to simplify smart specialisation related practices. We studied three Cretan and CM examples and showed how a restructuring of specific procedures governing the implementation of S3, can lead to better smart specialisation outcomes. We displayed that the simplification of processes must not be only conducted for practices directly related to S3 (e.g. actions immediately related to the entrepreneurial discovery), but also for other bureaucratic procedures which may not constitute a clear part of the S3 approach, but they have a direct impact on its development (e.g. the example of recruitment).

A third change to S3 governance is a move towards adjusting the way in which national-regional public-sector collaboration is currently taking place for the purpose of S3. Given the high levels of policy vagueness and uncertainty we captured in Crete and CM, there is an urgent need to change the way in which S3 tasks and responsibilities are currently regulated and communicated between regional and national-level authorities. We found that the key point of this change is to institutionalise a permanent and constant communication dialogue between regional and national public administration actors with a direct engagement in different S3 stages (e.g. design, implementation, monitoring).

The inception of certain policy adjustments to introduce a new way of governing the accumulation of firms' critical mass, was regarded in the findings as a fourth element of change to S3 governance. Furthermore, given the importance of entrepreneurial firms in the discovery process on the one, and their low participation in the Cretan and CM practices on the other, there is a clear need to change the way in which local firms' participation is governed and regulated in the framework of S3. We introduced the idea that merely targeting and selecting single firms in public innovation policymaking (as happening in the past) is not any more a policy option for the development of S3 and, therefore, this practice must be changed. We found that this change starts with the

introduction of new means of addressing public-private interplay. These means include the undertake of more intensive initiatives for collaborative synergies (e.g. for the promotion of business-science clusters and agglomerations), from which a large number of private firms will have the opportunity to participate in smart specialisation actions through S3 clusters and consortia.

A fourth key conclusion is that the existing institutions in Crete and CM are relatively weak and, therefore, part of them need certain changes to support the governance of smart specialisation and become responsive to what S3 seek to achieve. In particular, we found that institutional reforms, changes, and adjustments are critical to at least four different directions.

The first is to make public-sector administration more responsive to the S3 governance needs discussed above. To achieve this, we saw that the introduction of new institutions alongside existing rules, the process of layering (Mahoney and Thelen 2009), is vital. In particular, we saw that public-sector organisations are far too bureaucratic and untrustworthy to support innovation policymaking. To overcome public-sector reliability, corruption and other similar problems, we found that institutional changes must focus on improving the way in which specific public sector agencies are currently operating. While our analysis cannot propose specific changes for each of the regional authorities that have a key S3 role to play (we saw that different organisations require different structural reforms), it highlights the importance of performing a step-by-step investigation, in which the instruction of prospective reforms, changes and adjustments can be examined separately for each public-sector authority.

The second reform suggests changes in regions' legislative power which are critical for regional diversification and development. We found that the provision of additional institutional and legislative power can allow regions develop and enforce their own development laws. The creation of a new regionally-based legislative framework can, in its turn, cover regions' specificities and needs and build, therefore, a more

institutionally-friendly environment for S3 development. As an example of how increases in regions' legislative power is possible to affect S3 development, we evidenced regions' potential to attract S3 private investments through the provision of tax benefits. We saw that while tax incentives may be part of a specific development policy, their enforcement in practice requires sound institutions to appropriately support this policy.

The third reform is related to the implementation and enforcement of the institutions. We saw that the lack of an enforcement power in institutions causes public policy implementation problems, in the sense that a stable, fair and trust-worthy environment for S3 action is still missing from both regions.

Finally, as a fourth institutional change for additional flexibility in S3 governance, we recorded the proposition of an ambitious institutional reform which promotes the idea of spatial re-organisation to meet the objectives of S3. Given the small size of the case study regions and their weakness to fully accumulate the required critical mass, the examination of territorial restructuring through regional mergers can show whether innovation policymaking can be better addressed. This is a process of displacement (Busetti 2015; Mahoney and Thelen 2009), discussed in the literature review chapter, which highlights the necessity to remove existing formal rules and introduce new institutions to favour S3 implementation.

Chapter 8: Capacity building for smart specialisation strategies in catch-up regions

8.1 Introduction

In the previous chapter we investigated how existing and new institutional arrangements and governance reforms impact on smart specialisation practices. We also highlighted the need of conducting an investigation to understand empirically what capabilities exist and are required in the case of Crete and CM to favour these reforms and assist the realisation of regional policymaking in the S3 context. Chapter 8 seeks to meet this research objective by answering RQ3 *"What capabilities exist and are required to develop smart specialisation strategies in catch-up regional environments"*. It uses empirical evidence from the case study regions to meet a twofold research objective. First, it aims to identify what particular capabilities have been developed in the local ecosystems and currently exist for the two Greek regions to favour S3 development. Primary focus is given on those capacity building forms that have a direct impact on regional development and relate to formal or informal institutions and governance arrangements. This objective is connected to the first part of RQ3 *"What capabilities exist... to develop smart specialisation strategies in catch-up regional environments"*. The second objective is to investigate what capabilities are needed to tackle the difficulty of implementing S3 in both regions, fitting to the second part of RQ3 *"What capabilities (...) are required to develop smart specialisation strategies in catch-up regional environments"*. This section develops an exploratory approach to understand what capacities are still needed to assist governance and institutional re-configuration for the implementation of S3. Both parts examine capacity building at both the micro-level (firm-specific) and meso-level (regional).

A large number of policymakers and strategists identify the growing importance of S3 as a regional innovation policy tool, and emphasise on the emerging need to incorporate and harmonise its rationale in the regional setting (Kroll 2016). The problem, however, is that S3 has been incorporated in the regional innovation agenda as an *ex-ante* conditionality, without examining whether regions were fully capable to support its policy approach (McCann and Ortega-Argilés 2014). Moreover, while smart specialisation is indeed a smart approach to trigger regional diversification and development (Boschma and Gianelle 2014), it is still dependent on several social, political and economic place-specific aspects embedded in a national and regional environment. Arguably, in the case of Crete and CM, a number of questions were not examined analytically prior to the introduction of S3 as a regional innovation strategic tool. For example, do Cretan and Central Macedonian actors have the required capabilities to take a productive role in designing and implementing S3? To what extent do entrepreneurial actors' capacities allow S3 action plans to be implemented? If capacities are weak, what additional organisational capabilities are still needed to favour S3 development? Are regional capabilities appropriate to support governmental and institutional reforms to favour, facilitate and lead an effective discovery process? This chapter studies these sub-questions analytically, aimed to understand empirically how existing and potential capacities can affect S3 implementation in the Cretan and Central Macedonian context.

Chapter 8 is structured in two main parts. Part A sets out the framework in which different types of micro- and meso-level capacities are existing at present in the regions of Crete and CM. Particular attention is given to four types of capacities (*technological & innovation, networking, entrepreneurial and administrative - governance* capabilities). Part B investigates what new or improved organisational and regional capacity building forms are required to support the development of S3 in the selected regions.

8.2 PART A: Existing micro- and meso-level capabilities

This section examines what capabilities exist in the Cretan and Central Macedonian ecosystems, by investigating Technology and Innovation (T&I) capabilities, networking capabilities, entrepreneurial capabilities and administrative and governance capabilities. A qualitative analysis was performed, based on the responses we collected on organisations' and regions' capabilities. Table 8.1 summarises the results of the analysis. It presents the number and percentage of respondents per region who highlighted at least one aspect of capacity building; it also presents the total number of quotes for each capability form in both regional environments.

Table 8.1 Results of interviews: Number and percentage of responses

		No. of respondents			Percentage of respondents ^(*)			No. of quotes
		Crete	CM	Total	Crete	CM	Total	Total
Type of Capability	T&I	13	12	25	43%	60%	50%	74
	Networking	17	12	29	57%	60%	58%	100
	Entrepreneurial	14	11	25	47%	55%	50%	60
	Administrative/governance	6	8	14	20%	40%	28%	32

^(*)Based on a total number of 50 interviews: Crete=30, CM=20

Source: Author

As shown in Table 8.1, we generated a total number of 266 quotes in NVivo, from which 34 single quotes were used in Part A to develop and support the evidence-based inferences. The results are presented in the following sections.

8.2.1 Technology and innovation capabilities of firms

To investigate firms' Technology and Innovation (T&I) capacity, we elaborate an empirical framework which allows an in-depth analysis that goes beyond the narrow examination of the usual T&I indicators employed by several EU studies to assess innovation performance (e.g. expenditures on business R&D, non-R&D innovation

expenditures, EPO patent applications etc)¹⁷. In general our findings reveal different innovation paths and a rich diversity of T&I capacity at the level of firms. As explained later in detail, we found that in the Cretan and CM context, the ability of firms to innovate and make effective use of technological knowledge varies greatly across different types of businesses and sectors. For example, we have seen very innovative firms in industrial sectors that are usually able to lead high-tech industries and develop a supra-national reputation through incremental innovations; firms with good business ideas and entrepreneurial potential but with rather weak capacity to incorporate innovation and new technologies to diversify their entrepreneurial plans and business models; and firms, mainly retailers, with significantly low technological and innovation potential. To analyse and understand specific patterns of T&I capabilities, we grouped Cretan and CM companies into three basic categories: *Zero-level capability firms*, *Technology & Innovation Learners* and *Technologically-mature firms*. The formation of these groups emerged from the analysis of the interview data gathered both from the private and public sector. The key features of each group are examined and presented below.

8.2.1.1 Group A: Zero-level capability firms (ZLC)

The first group comprises technologically inactive companies with no ability to develop T&I competencies. Bell and Pavitt (1995) argue that the resources and assets that are likely to support the development of technological capabilities are embodied in skills, competences and organisational systems. Similarly, Lall (1992) suggests that beyond skills, technology usually requires effort and financial investments by the receiving firm. In the case of ZLC, firms do not usually possess any of these critical aspects to introduce, develop and make sense of any advanced technology or innovative application with the objective of supporting or integrating basic business

¹⁷ We note that quantitative indicators which assess the innovation and R&D trends in Crete and CM are presented in detail in chapter 5, Table 5.1

functions (e.g. improve production lines or product quality). The respondents underline that the majority of the companies in the ZLC group have the characteristics of the *technologically illiterate* firms, with a very low technological background and potential for initiating technological learning.

Our analysis suggests that ZLC firms represent high levels of introversion and critical gaps in exploiting technological applications and mobilising organisational learning. Usually, they are family-owned businesses, characterised by outdated business thinking and weak organisational models. They are found to operate in various areas of the local economy, particularly in traditional industries of the primary sector (e.g. agriculture and farming), as well as in the service sector (e.g. commercial retail). They lack incentives, motivation and willingness for organisational change, and they are usually unable to build productive capabilities. This view is evidenced by using data from interviews with representatives from diverse local business networks and associations in Crete and CM. The respondents believe that ZLC firms are not economically viable, they usually do not comply with the national regulations and, from an innovation perspective, there is no potential as they operate in cognitive isolation. We present an indicative quote from a CM business expert which reveals the limited potential of ZLC firms to develop T&I skills¹⁸.

These entrepreneurs don't really believe in innovation, they are not interested in innovation, they don't really care how to develop new products or how to improve their existing products, you know, if it works well, just leave it and don't try any attempt to improve it (MACM20, 2015)

From a policymaking perspective, it is worth noting that ZLC firms cannot be included in any official survey of innovation activity in the enterprise sector. Hence, our knowledge and understanding of what specific policy options would be the most relevant to improve innovation capacity in this low-level innovation group is limited.

¹⁸ A full list of all semi-structured interviews is presented in Appendices

This aspect raises policy questions as to how and under what conditions ZLC firms could potentially have an active role in the implementation of S3.

8.2.1.2 Group B: Technology & Innovation Learners (learners)

The group *learners* includes most of the local firms which are found in both regional ecosystems in several industrial sectors. They are firms with a relatively low T&I potential. However, they seem to understand the importance of technological innovation and, consequently, they have started building learning mechanisms to improve various organisational skills and competences for innovation. The development and exploitation of these skills constitute the driving force of creating potential T&I capabilities. The process of acknowledging the importance of T&I, is, in fact, the first cumulative effort of these firms to learn how to use their technological resources and assets to develop innovation capabilities. In the data, this is a notable indicator of difference between learners and ZLC firm.

Furthermore, the responses from both regions show that learners operating in the services industry, are more capable in developing organisational and marketing innovation, instead of product or process innovation, which is more frequent in industrial sectors. This finding is also evidenced by EU and national studies, which shows that firms which introduce marketing or organisational innovations are usually operating in the services sector, while those with product or process innovations are frequently found in industrial sectors; see for example (EC 2016; EKT 2015c). Additionally, the respondents tend to mention that the ability of the learners in developing innovation is more profound in incremental rather than in radical innovations, for which the interview responses show the presence of knowledge-intensive actions as a key necessity. In general, learners' capability to generate innovation is not systematic; it happens on an ad-hoc basis, through their participation in public research projects and other types of business synergies. The responses display that local academia plays a dominant role in stimulating firms with a relatively good

technological background to participate in joint R&D projects in order for the first to meet the project requirements and get access to funding. Through these projects, firms usually develop project management techniques and technical competences. Within the learners group, university start-ups and spin-offs are more regularly involved in R&D projects, due to their knowledge proximity with academic and research centres.

In addition, we see that learners usually are firms that are more labour-intensive, as innovation has not been fully embedded in their business and organisational mentality. For example, more than half of the respondents mention that learners do not reserve a specific budget for research, and that T&I improvements do not usually result from R&D activities as broadly argued by an important part of the innovation literature (Kirner, Kinkel, and Jaeger 2009). Rather, it is the result of other important determinants of innovation capacity, including the benefits of networking learning from daily business activities, and the acquisition and adaptation of incoming technology from external sources. Concerning the latter, we present the words of a CM entrepreneur, which show why an important number of firms have not developed proper capacities to generate knowledge internally:

Firms were not used to look for new technologies, technology was there, available for them, mainly coming from abroad. It was better to buy existing technologies and not to jointly develop with a university or a researcher centre to cover their technological needs, because the policies for the enhancement of entrepreneurship, from '70s onwards, covered various costs of investments. These policies were there to cover the costs of new technologies, the costs of new infrastructures. Hence, companies could find money to buy new knowledge and technological solutions externally through various state grants and programmes. National policies and strategies provided good money and there was not any enticing reason for them to change their business routines and take any risk (XACM29, 2015).

Interestingly, the fact that previous state-aid policies were not aimed at supporting firms creating their own internal knowledge bases, highlights the

inefficiency of the institutional framework to promote the development of knowledge-based T&I capabilities. However, this inefficiency was not the only reason which prevented local entrepreneurs from developing in-house technological capabilities. The interviewees disclose a mixture of regional and national policymaking attributes which can possibly explain the reasons that most of the Cretan and CM firms (mainly learners) failed in developing strong T&I capacities. Furthermore, we identified relevant responses from different stakeholders and grouped them into different categories, by using a matrix coding query in Nvivo. We found that capacity building failure arises in three different ways. The result are presented in Table 8.2, which provides a synopsis of the most reported reasons that Cretan and CM ecosystems have not been fully able to increase their T&I capacity at the regional level.

Table 8.2 Most reported reasons for meso-level shortcomings in regional innovation capacity building

Meso-level shortcomings	Explanation
Investment laws	1. Public funding was available for firms to invest in infrastructures, buildings and machinery, not in R&D and innovation
Policies for networking, clustering and systemic innovation	2. Lack of strong networking and clustering policy, geared to support firms' engagement in innovation networks, R&D clusters and other forms of agglomeration. 3. Weak industry-academia linkages
Enablers of regional innovation	4. Weak role of the Regional Innovation Councils and lack of public-sector innovation agents and technology transfer mechanisms, lack of clear regulations on innovation activity

Source: Author

From a general perspective, our analysis displays that learners may have good business ideas but with limited T&I potential. In this case, the respondents indicate that there are businesses with increased export activity of their products (exporting

capacity) which however, are not innovative and competitive in the global market. They tend to highlight that the main barrier of these firms to generate high-tech products and technological innovations is the lack of well-educated and specialised personnel (e.g. masters, engineers and MBA holders), their inability to establish permanent communication channels with knowledge creators (e.g. universities) and their difficulty to identify and use available tools relevant to introduce new innovative methods of production (e.g. they are not familiar with technology-self and technology-audit tools, they are not fully aware of the ongoing technological trends etc). The explanation of each of these barriers to innovation and new product development has been evidenced separately in the datasets. As to the personnel of the business sector, the data indicate a new tendency in the business community, which is to recruit low-cost staff (usually inexperienced personnel) as a means of cost-cutting measures in a period of crisis. The words of FRCr17 (2015) are indicative:

Companies should recruit new, modern and well-educated personnel to become innovative and complete. They should invest in human capital and not just recruiting the less expensive ones, you know, we need to see the game from a longer-term perspective (FRCr17, 2015)

The idea of this quote is that when innovation becomes the central issue in a business, looking for low-cost staff only is not a realistic option any more.

8.2.1.3 Group C: Technologically-mature firms (TMF)

The respondents indicate a small number of Cretan and CM manufacturing firms that are able to combine and use a set of resources and competences to take advantage of new technological opportunities. These companies have developed relevant production capabilities to recognise and exploit technological opportunities to improve business performance and create a competitive advantage through product and process innovation. The innovation capacity of these firms is due to their

technological progressiveness which is usually equated with long-term investments in R&D and means of IPR protection to manage and protect their intellectual assets. We call these companies *technologically-mature firms (TMF)*. The profile of these firms is given by an R&D manager from a TMF company:

We strongly believe that innovation is the driving force of our company, as it seems to be the only way to achieve diversification, in fact, it's a vital component which is critical for our survival. R&D is also central. Usually, we establish technological collaborations and participate in research projects to improve process and product innovation. The reason we participate in R&D projects is to find solutions to our problems and not to get access to funding; also, through R&D projects we get access to new human capital to fulfil our research objectives. We use a combination of patents and know-how secrets to introduce new product development and design our own business models (MECr13, 2015)

The TMFs have the characteristics of a technology leader, which according to Forbes and Wield (2002) has the ability to create new knowledge and use its existing or new technology to introduce new products in the market. Three of the top-level managers we have interviewed from the TMF group, tend to highlight the importance of innovation to diversify their products and get access into new markets. They also highlight their learning capacity to draw upon a diverse set of production capabilities to produce new innovative products and move into new entrepreneurial directions, in a globally connected environment (Mastroeni, Tait, and Rosiello 2013). The process of developing production skills is an important part, which usually comprises the ability of TMF to design, implement and monitor small and large-scale technological projects, either internally with the development of in-house projects, or externally through their leading participation in cross-regional R&D synergies. In this respect, TMF have developed production abilities appropriate to diversify into products that are technologically related to their current products (Boschma and Frenken 2009, 2). Indicatively, MECr13, 2015 says:

New product development is very much based on the upgrading of our previous or existing products as well as on the exploitation of new technologies (MECr13, 2015)

There are a number of cases which show that technologically strong companies succeeded in entering into new foreign markets due to product diversification achieved by the systematic exploitation of technology advances. In this case, technology is seen as the most important tool for achieving a sustained competitive advantage, through the creation of new market opportunities. Successful examples include companies such as Plastica Kritis SA and Megaplsat SA which have been gradually expanding their businesses in Europe, Asia and the US¹⁹, owing to important investments in T&I. Moreover, interview evidence shows that critical to this internationalisation process is the existence of high qualified personnel (managerial skills) and the development of internal organisational cultures which are closely aligned with the acquisition and assimilation of new knowledge and know-how. We present a short quotation provided by MECr13 (2015):

We achieved important improvements in our production and also expanded our businesses abroad by improving the technological competencies of our staff members in the production line (MECr13, 2015)

The respondents display that most of the TMF are likely to be either at an early stage of development (e.g. mainly university start-ups, spin-offs and science-based enterprises) or at an advanced stage with long business experience in the field (e.g. well-established companies in knowledge-intensive industries). Plastica Kritis SA and Megaplsat SA are two examples of well-established companies with notable innovative capacity building.

¹⁹ for more information see chapter 6

Indicatively, we refer to Megaplast SA, which holds a family of ten patent applications, which protect five different products²⁰.

8.2.2 Summary of firms' innovation and technological capacity

The findings show that firms have a diverse range of innovation and technological capabilities in the regions of Crete and CM, showing that they cannot be considered and analysed as a homogenous group. The variation on T&I capacity across the different typologies of firms we have created is indeed notable, characterised by significant discrepancies. Table 8.3 illustrates these variations in respect to firms' T&I capacities.

²⁰ data gathered from <http://www.megaplast.gr>, (18 January 2018)

Table 8.3 Summary of characteristics of firm-level T&I capabilities

Typology of firm	Level of capacity	Intensity & mode of innovation	Main characteristics	Types of companies
<i>Zero-level capability</i>	Very low	No innovation	<ul style="list-style-type: none"> ▪ Lack of technological skills & innovation competences ▪ Lack of technological background and learning potential ▪ Disincentives for organisational change ▪ Lack of other forms of capacity building ▪ No R&D activities 	Family-owned firms, micro-enterprises, local retailers,
<i>Technology & Innovation Learners</i>	Low to Medium	<p>Incremental innovation</p> <p>Organisational & marketing innovation</p>	<ul style="list-style-type: none"> ▪ Understand and acknowledge the importance of technological innovation ▪ Ability to exploit generic technological applications ▪ Difficulties in accessing critical technological knowledge ▪ Project management techniques ▪ Technical competences 	<p>Low-tech firms, Start-ups</p> <p>ICT firms, industrial manufacturers, branches of national & international companies, start-ups</p>
<i>Technologically-mature</i>	Very high	<p>Incremental and radical innovation</p> <p>Product & process innovation</p>	<ul style="list-style-type: none"> ▪ Investments in industrial R&D ▪ Ability to diversify products ▪ Patent holders, use patents as a means to access and assimilate technological knowledge ▪ Follow the technology frontier ▪ Managing tacit-knowledge 	Firms in knowledge-intensive industries (plastics, chemicals, food possessing etc), spin-offs

Source: Author

8.2.3 Micro- and meso-level networking capabilities

In this section we use empirical evidence to examine what networking capabilities exist to assist S3 development, and to what extent. In general, the data (33 out of 50 respondents) display weak intra-regional networking activity among diverse players who have a key role in designing and developing regional innovation strategies. The respondents mention that this weakness is more profound in the process of linking innovation-related actions rather than in connecting entrepreneurial initiatives. However, apart from simply discussing this broad finding, we also identify and evidence certain cases in which inter-organisational networking capabilities are found to be stronger and more effective than those existing in typical local trends. The presence of weak networking skills and competences can be identified both at an organisational and institutional context. The organisational level refers to individual actors, while the institutional level is discussed through the prism of regions. In this respect, the analysis falls into two levels: the micro-level and the meso-level. The analysis at the micro-level investigates organisations' networking capacity, with a particular focus on understanding what specific competences have been developed by private firms to build inter-organisational capabilities. The analysis at the meso-level studies capacity building from the regional perspective by investigating the ability of Crete and CM to address institutional networking and connectivity to promote change in regional innovation and development.

8.2.3.1 Firm-level intra-regional networking behaviour (micro-level)

At the micro-level, we found that the capacity to develop inter-organisational relationships to access and exploit exogenous resources (e.g. knowledge, know-how, technology etc), varies remarkably across and within different groups of local entrepreneurs. The respondents represent high consensus on the opinion that the size of firms and the type of their business sector are two factors that highly affect firms' organisational ability to create and exploit networking competences. Specifically, 12

responses reveal that firm size tends to have a significant effect on capacity building in the sense that the smaller the company, the more difficult it will be to build inter-organisational networks. The type of business sector and the area of specialisation also shape the way in which networking capabilities are created and developed (e.g. the case of the wine industry which is discussed in later sections).

Interestingly, companies of different sizes represent different potential for networking, and therefore, develop different networking behaviours. Firm size and ability to build other capacity building forms is also related with the type of networking (e.g. networking to promote innovation, networking to meet entrepreneurial objectives etc). For example, nearly 70% of the respondents who were asked to discuss the context of building organisational collaboration skills, mention that the capacity to build firm-level networking competences is relatively low due to the fact that most of the local firms are micro-enterprises²¹ or family-owned companies in the sense that the family controls management and perhaps other business operations²². According to this view, apart from the limited financial resources which block the configuration of communication skills, micro-firms are not usually able to develop a collaborative learning environment due to their organisational practices and routines developed over years. In practice, the main problem with the family-owned firms and micro-enterprises is that they have not yet developed a strong collaborative mentality to systematically interact with their networked environment (e.g. interplay with universities, research centres, public agents). Most importantly, micro-firms lack other types of capacity building (e.g. absorptive capacity, technological and innovation capabilities) and, also, they are not willing to get connected with other local players to share business ideas and develop synergetic advantages, fearing loss of competitive advantage through the exchange of entrepreneurial ideas and business secrets.

²¹ According to the EU definition, micro enterprises employee less than 10 people with an annual below €2 million (source: <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3An26026>)

²² Micro-enterprises in Crete and CM with fewer than five employees represent more than 97% of the whole business population (ELSTAT 2016), constituting an important unit of analysis for innovation and entrepreneurial studies.

Additionally, they do not possess the appropriate mechanisms and resources (particularly from the human resources perspective) to transform their competences into strong inter-organisational capabilities and, therefore, their ability to build either entrepreneurial or innovative networking competences remains at low levels. This implies that it is rather unlikely for micro-enterprises to take part in innovation networks, implement R&D projects or be part of other related knowledge-based initiatives. At least, in our findings we have not captured such networking trends at a notable level. Instead, the data evidence that in the case of micro-enterprises, networking provides opportunities for accessing information in two ways: either through the direct interaction with customers and suppliers or through their membership in small-scale business-oriented associations. Concerning the latter, it is worth noting that there are cases in which a few micro-enterprises have developed some networking skills to get connected with related businesses to increase annual sales through business-oriented associations (e.g. micro-firms with less than five employees in retail markets and local shops function under business corporations to benefit from economies of scale). Examples of companies which have upgraded their networking competences owing to their participation in business associations include the Ariadni CRM partnership which accounts nearly 90 members throughout the island of Crete (mainly small-grocery stores) since 2012, as well as the Helios partnership established in CM which connects 150 local retailers²³. However, while such initiatives promote the development of business networking skills at the local level, these skills are too abstract to generate innovative and sustainable entrepreneurship. The manager of a development agency in the region Crete stated:

Family-owned companies, particularly the smaller ones, do not collaborate with other companies or organisations to generate innovation, due to their mentality, you know it's a matter of fear, lack of trust I would say, collaboration is something which is out of their

²³ Additional information in Greek: <http://www.heliosgroup.gr> and <https://www.crm-ariadni.gr>

organisational culture, they are not familiar with group working practices (FRCr17, 2015)

Concerning the type of business, the data shows that firms operating in a diverse range of knowledge-intensive industries (e.g. bio-tech, chemicals, plastics) are more likely to take part in either intra-sectoral or inter-sectoral innovation networks and technological synergies to support innovation and R&D activities. These firms represent a higher collaborative tendency for S&T partnerships as to some extent, they retain their own R&D competencies. On the contrary, firms of more traditional industries (e.g. service sector, agro-food etc), tend to develop organisational skills and competences related to entrepreneurial networking. Both views have been recorded in the datasets; we present the words of an intermediary organisation expert which shows this tendency:

High tech companies and start-ups show better performance in building research collaborations with the university, comparing to more traditional companies of the services sector which usually develop entrepreneurial and business synergies (SACr1, 2014)

The wines of Crete Network as a case of entrepreneurial networking

Concerning entrepreneurial networking, the most successful example of linking homogeneous firms to enhance entrepreneurship (rather than innovation) is possibly the Wines of Crete, initiated in 2006 to connect local wine companies in the region of Crete. The Wines of Crete began its operation from the prefecture of Heraklion, followed by other local producers who joined the network from the other three administrative prefectures of the island. Its main objective was to make Crete world-renowned for its ability to produce world class quality wine. Financially, the network is independent, deriving capital from its members. Additional funding comes occasionally from national and European funds through funding programmes or other related actions. The Wines of Crete network is an interesting example in the regional context,

which shows the ability of a number of firms in a specific local industry to set entrepreneurial networks with the objective of promoting inter-organisational learning. To indicate the importance of the Wines of Crete Network in the local winemaking industry and highlight its prospect to turn into a local cluster, KACr12, 2015 mentions:

This initiative seems quite successful at the moment. These guys are good; they focus on new product development. For example, they invest in bringing back local grape varieties which have been disappeared, they conduct research in grapes and produce products with specific features and standards appropriate for exporting. This is a best practice for Crete, isn't it? Nobody else is performing like this at a regional level (KACr12, 2015)

The interviews with other individuals engaged either directly or indirectly in the network, we saw that the example of Wines of Crete reveals a dynamic approach in which the creation of firm-specific networking capabilities is linked with know-how sharing (e.g. exchange experiences to improve product quality) and getting access into new foreign markets (e.g. by exploiting economies of scale). Concerning knowledge sharing and inter-organisational learning, LYCr49, 2017, one of the Network founders which is currently an active member and develops a leading role for the transformation of the network to a local cluster, points out:

I don't have any problem to share know-how and expertise with other wineries, for example with new incoming members in the network, because companies in this sector do not have business secrets (LYCr49, 2017)

The fact that local wineries did not fear losing competitive advantage from the leakage of a sensitive business information, (e.g. know-how in wine bottling or wine preservation techniques), acted as a facilitator in promoting inter-organisational networking in the local wine industry. As to the benefits of the network to access new foreign markets and promote internationalisation, KACr12, 2015 says:

Through this network, winemakers develop quite similar goals, achieve economies of scale and plan joint actions for their expansion abroad in markets such as Canada, Australia, US, they don't do it individually anymore, they do it as a network (KACr12, 2015)

8.2.3.2 Networking capacity and institutional patterns at the regional level (meso-level)

Inter-regional networking and cooperation

This section analyses the ability of the case study regions to develop and promote networking within and outside the regional boundaries. Besides, local actors' networking is important for knowledge spill overs within the region (Asheim and Cooke 2011) and beyond its boundaries (Grillitsch and Nilsson 2015). Starting from the latter, the respondents identify regions' capacity to build inter-regional networking to promote entrepreneurship and innovation in specific areas of regional specialisation which is owed to three main reasons. First, it is due to the collaborative skills that Crete and CM have gradually deployed through their participation in a series of territorial cooperation programs launched by the EU (e.g. Interreg programme). Through the implementation of several cross-regional programmes, regional authorities upgrade their project management and networking skills with the objective of improving regional performance. Second, it is because of the highly motivated actions of the regional authorities to lead foreign entrepreneurial missions and launch trans-regional cooperation agreements to promote and network local entrepreneurship abroad. Third, it relies on the high degree of extroversion of specific individual actors from both the private and public sector. In relation to extroversion, a leading role is played by the local academic community, for which we have seen a widespread acceptance for their competences to link and communicate R&D activities at an international level. However, as discussed later in this section, the capacity to connect academic knowledge and take advantage of R&D collaboration networks is limited when intra-regional linkages come to attention, particularly for the interplay of academia-industry.

In our findings we see that while inter-regional connectivity is seen as the opening up of new entrepreneurial opportunities, it represents some differences in the way it is addressed in Crete and CM. This is mainly due to their different spatial proximity. For example, respondents from CM reveal a relatively leading role of the region in setting and running strategic linkages with neighbourhood areas mainly from Bulgaria and FYROM for the production of textile, clothing and footwear. In this context, they highlight the dynamics of CM to affect the development of specific economic areas in the Balkans, as also indicated in previous innovation studies (Region of CM 2014). A fairly good performance of the region in building and promoting inter-regional connectivity in certain industrial sectors is also highlighted in the cross-border cooperation programme for Greece and Bulgaria, which shows economic success and high participation rates in developing joint programmes (Region of CM 2015). However, we have captured responses which suggest that inter-regional networks are not always conducted systematically, but rather occasionally, depending on the available funding offered by cross-border programmes launched by the EU. A local policymaker from the region of CM says:

It's good to see the interaction and results from the EU Territorial Cooperation Programme, say for example Greece-Bulgaria 2007-2013, but does this inter-regional cooperation go on when EU programmes end? I'm afraid not (KOCM25, 2015)

The main idea of this quote is that certain business activities of the core industrial sector of the CM economy which are linked with the several cross-regional networks are dependent on several EU cross-border policy initiatives.

On the contrary, Crete shows a slightly different picture in triggering and promoting cross-regional networking, mainly due to its geographical isolation and the nature of its local entrepreneurship and economy. Given that Crete is an insular region, its ability to promote cross-regional collaborations and establish overseas ties with

other areas is more profound in the services rather than the industrial sector. This finding is also linked with the fact that Cretan economy is dominated by the service sector (OECD 2005). In addition, we saw that Cretan cross-regional linkages are not usually developed with neighbourhood areas, but rather with other regions and countries within and outside Europe. For example, a number of the Cretan respondents highlight the relatively high institutional ability of the region to maintain and endorse international networking linkages for the promotion of innovative tourism products. Interestingly, such networking endeavours include the promotion of business linkages not only with European but also with other foreign regions from Asia and Australia. The responses display also high levels of regional extraversion in business sectors dominated by high quality of agro-products. Most of these partnerships have been conducted through a series of cross-regional trade agreements between Crete and other foreign territories to support regional integration.

Patterns of intra-regional networking

The results on intra-regional networking and institutional cooperation display diversity on the way, and the extent to which, capacity building has been developed over years in the selected regions. For example, we identify cases in which institutional networks are weak to effectively connect the activities of diverse regional actors. These cases refer mostly to public-private networking, with an emphasis on business-science networking initiatives, discussed thoroughly in the following sections. On the other, good practice in intra-regional connectivity is derived by examples such as the Wines of Crete and the Agro-nutritional Cooperation of Crete, which seek to network local producers operating in the agro-food sector. As to the latter, it is a public-policy initiative which supports firms' connectivity in specific areas of the local economy, and it has been identified as a good practice by a number of the respondents from both the private and public sector.

(A) Public-private networking

Public-private networking is studied through the lens of industry-academia collaboration, which is seen to play a dominant role in the realisation of the self-identification process (Rodrik 2001; Foray 2016). Therefore, with regard to the regional ability to collectively embrace and promote university-industry interaction, we observe a local paradox: though there is a strong scientific community, with well-established research infrastructures at the national level (EKT 2015c), university-industry networking remains at low levels and rather inefficient to stimulate regional specialisation and diversification. As an exception to this generalisation, the respondents indicate the ability of a small number of knowledge-intensive companies, usually hosted in science parks and technology incubators, to develop networking competences to link their businesses and technological operations with academia. These companies are normally university start-ups and academic spin-offs, that have a cognitive proximity with local universities and research bodies. The relatively higher ability of these companies (comparing to other traditional entrepreneurial actors) to communicate and interact with academia is pointed out by ANCr11 (2015) who says:

Spin-offs and start-ups have an innovative potential as they tend to keep a close relation with university research labs (ANCr11, 2015)

The responses show that the geographical proximity, in the sense that local actors co-exist in a relatively small location which enhance knowledge flow and agglomeration effects, is also important for building strong business-science partnerships. In this respect, SACr1 (2015) says:

In a relatively small geographical area many different institutes are located including the Foundation for Research and Technology, the University of Crete, the Technological Educational Institute of Crete, the university hospital, the Science and Technology Park of Crete, the business incubator. All these institutes constitute the formation of a

significant agglomeration which allows for a fast and direct interaction among its members (SACr1, 2015)

According to our findings, the paradox discussed above, is due to at least to five place-specific reasons:

- i. Lack of a culture of collaboration and the different understanding of strategic networking between industry and academia. Specifically, we refer to a representative sample of the respondents who highlight the different attitudes that universities and firms are usually having when building networking capacities. In their view, universities and research centres tend to look for scientific excellence when building networking, while firms for making money and, therefore, science-business synergies do not usually lead to commonly expected outcomes. For example, academia is engaged in industry-academia projects to publish scientific work and strengthen its science linkages further, while companies usually participate to cover payrolls and other costs of doing business so as to produce profits. The following quotes, provided by a university professor, are indicative and reflect on the interviews' findings:

Researchers are thinking of publications and papers while entrepreneurs are thinking of money; they speak different languages, they look for different things and the outcome of their work is different (ANCr11, 2015)

- ii. Trust building problems associated with inefficiency in previous innovation policymaking (e.g. limited policy impact on companies through their participation in previous innovation programmes). The respondents identify low levels of public trust. The interesting point is that more than half of the interviewees (54%), no matter if they were asked a relative question, mentioned that the lack of state trust (mainly from the private sector to the

public authorities) is still a barrier for developing private-public linkages. In this respect, SOCM37 (2015) says:

The local enterprises don't trust regional authorities, as they have never focused on their actual problems (SOCM37, 2015)

- iii. Lack of effective intermediary mechanisms and science-business translators to promote partnering between two worlds that speak a different language. For example, the interviews show that while science parks, business incubators, liaisons offices, and other technology transfer mechanisms have been established in both regions since years, their potential to connect diverse policy initiatives and actions is characterised low by most of the respondents. We present two representative quotes to illustrate shared perceptions in both regional environments.

While we have established intermediary organisations and brokerage structures in Central Macedonia, nobody takes an active and continuous intermediary role, and intermediaries are crucial for setting industry-university collaboration (GECM33, 2015)

All previous efforts, for example the development of liaison offices, innovation centres, centres for the development of entrepreneurship failed. A lot of money were spent without bringing the required outcomes (KACr5, 2015)

- iv. Discrepancy between areas of academic research and local economic sectors. To discuss this interesting finding, we draw attention to two examples, presenting interview quotes from both regions. From the region of CM, PECM26 (2015) says:

Traditionally, innovation actions undertaken by local research bodies are entrepreneurially fragmented and scattered. They are not designed to support local economy, neither to cover local entrepreneurial needs and regional development (PECM26, 2015)

As an example in the case of Crete, we refer to what a couple of the respondents have highlighted. Furthermore, while tourism has been selected as a key S3 domain for future specialisations, local academic research is not oriented towards tourism studies and research. Indicatively, the desktop research shows that there is no tourism department at a public university level for tourism studies, while there is no research lab predominantly focused on tourism research. Surprisingly, higher education in tourism is mainly provided from private universities located mainly in Athens and Thessaloniki, as well as from universities abroad. There is a higher school of tourism education located in east Crete²⁴, which however provides professional training geared to hotel and tourist businesses.

- v. Easy access to public funding. There was no need for both universities and firms to develop skills for inter-sectoral networking. Access to funding was a relatively straightforward process for universities through national grants and their participation in national and EU funded research programmes, while for most of the companies through their participation in the developmental or investment laws. Notably, in previous years, public investments were seen as a first priority and, therefore, public funding was provided broadly to an extended number of companies in various sectors and industries. The respondents display that illegal overpricing of materials and equipment as well as other similar 'virtual' practices conducted by a number of project beneficiaries were a common secret to increase firms' funding. In order to put an emphasis on the lack of

²⁴ <http://astecrete.edu.gr/?lang=en>

actual incentives for the local firms to invest and acquire new knowledge, one of the interviewees says:

Why should entrepreneurs take the risk to invest in research and innovation when money comes fairly easily from the Greek development law? Innovation is tough with uncertain results; the development law is safe (FRCr17,2015)

(B) Public sector cooperation

There is a widespread belief in the responses that cooperation between regional and national actors, that are responsible for innovation policymaking and action, is fragmented in the sense that it occurs occasionally. Specifically, the interviewees display that the communication among regional actors (e.g. public authorities within the same region) and between regional and national actors (e.g. ministries with local agencies) lacks a strong and trust-based collaborative focus. For example, SOCM37 (2015) says:

Greek ministries don't fully trust Greek regions run smart specialisation strategies, and still don't do (SOCM37, 2015)

In this example, the respondent reveals that national ministries do not trust regional authorities to design and run innovation policies, fearing of regional-level corruption and local lobbies.

8.2.4 Entrepreneurial capabilities

In our analysis we incorporate the view that entrepreneurial capabilities are not only relevant for private-sector entrepreneurial actors but also for other organisations such as universities and research centres. We also accept the view that the concept of entrepreneurial capacity may go beyond organisational boundaries (Ács, Autio, and Szerb 2014), given that it can take a regional dimension where the interaction of

networks of entrepreneurial actors may shape the entrepreneurial potential of a region. Therefore, we examine entrepreneurial capabilities from three different perspectives: academic entrepreneurship, firm-level entrepreneurship and regional entrepreneurship.

Micro-level

8.2.4.1 Academic entrepreneurship

Academic entrepreneurship is a relatively new concept in the entrepreneurial agenda of the two regions, given that for years there was a common belief (mainly from academics) that entrepreneurial activities should stay away from universities. This view has been largely supported in the responses which show that while this general opinion is now changing, it has affected the ability of academic centres to develop and improve various skills appropriate to promote university-generated entrepreneurship. Moreover, there is a high consensus among Cretan and CM respondents that the ability of research centres and universities to promote academic entrepreneurship is relatively weak. Also, they point out that the degree to which research is integrated into marketable applications is different between universities and research centres, with the latter showing better commercialisation performance due to their legal status which allows for less bureaucratic rules in internal processes²⁵.

The interviewees highlight that research centres and universities in Crete and CM have developed both hard and soft institutional infrastructures to support academic entrepreneurship (e.g. through the process of spin-off venture formation). It is argued that such structures are possible to enable and support the initiation of university entrepreneurial activities (Clarysse et al. 2005). Typically, hard infrastructures include the operation of liaison offices, business incubators, science parks, technology transfer offices (TTOs) etc. The establishment of TTOs for research

²⁵ We remark that research centres are state-private entities, while universities are state-public bodies with much more bureaucracy and strict internal practices.

centres and the creation of liaison offices for universities, initiated from 1994 onwards through the operational program Research and Technology-EPET II, co-funded by the EU and the General Secretariat for Research and Technology. The EPET II program was a catalyst for the upgrading of the public research and technological infrastructures (GSRT 2000). The Science and Technology Park of Crete was created in 1993, while the Thessaloniki Technology Park was established in 1994, as two fundamental mechanisms for the promotion of knowledge-based entrepreneurship. Soft institutional arrangements refer usually to the introduction of a series of policy initiatives and programmes geared to support commercialisation practices. Examples of such tools include the implementation of national and EU funded programmes, the design of in-house commercialisation routes and methods of IPR management and protection.

However, while such tools have been introduced since years, local academic bodies are characterised by the respondents as having weak capacities to exploit them for the promotion of entrepreneurial activities. As to hard infrastructures, FRCr17 (2015) presents some interesting quotes to indicate the weakness of university TTOs, while ANCr11 (2015) discusses the inefficiency of soft infrastructures by showing the low impact of previous innovation policies.

I know universities have liaison offices, but they appear in some way inactive and ineffective, so I think universities need to adjust their existing structures and make them accessible and active to the business community (FRCr17, 2015)

We need to avoid what happened with previous R&D projects and development programmes which in general didn't bring the required effects, and at the end of the day nothing really important happened, just some small and fragmented improvements with very limited added value (ANCr11, 2015)

The difficulty to integrate their institutional mechanisms and routines, particularly in a crisis period, is seen by the academic respondents as one of the most important barrier in promoting academic entrepreneurship. They disclose the existence of university ideas with possibly good business potential, which however are not usually transformed into commercial applications, due to the lack of seed-funding and the limited interaction between universities and local firms' networks. As an expectation, the respondents cite the case of FORTHnet, a spin-off company created in 1995 by the Foundation for Research and Technology (FORTH-HELLAS) in the region of Crete. To highlight its leading role and success as an academic spin-off, the head of the innovation department of FORTHnet points out that:

FORTHnet was the company which introduced the internet in Greece; it became a member of the Athens stock exchange in 2000 and at present, it's one of the two-three largest telecommunication and internet companies in Greece (STCr2, 2014)

Possibly, FORTHnet is the most successful example of exploiting academic entrepreneurship in the country.

8.2.4.2 Firm-level entrepreneurship

We found large diversity in the ability of local firms to develop organisational competences to identify and exploit entrepreneurial opportunities. This diversity not only refers to the extent to which entrepreneurship is being conducted by diverse firms, but also to its nature and type (e.g. start-up entrepreneurship, research-based and knowledge-based entrepreneurship). For example, if entrepreneurial opportunities are closely linked with the introduction of state-of-the-art technologies and high-tech innovation, then the ability of the local firms to demonstrate a productive output is low which reflects a relatively weak entrepreneurial ability. In general, the analysis shows that the majority of the local micro-enterprises have developed organisational competences to address low-level entrepreneurship in which a combined presence of

advanced technology and innovation is not seen as a necessity. In the days of crisis, such entrepreneurship includes usually ventures in mass catering industry and retailing. This trend is confirmed from national statistics published during a period of 2008-16, which shows that nine out of ten new business ventures were usually found in non-innovative sectors (e.g. food retail, cafes and restaurants, clothing and footwear stores); a representative year is 2012, in which nearly 23.5% of the new business ventures were recorded in catering and entertainment sectors (Kathimerini 2013). These firms do not usually take entrepreneurial risks, in the sense that research and innovation are not incorporated in firm's business functions. In this respect, one should not expect these firms to develop top-leading entrepreneurial skills to recognise and exploit new business opportunities to initiate domain specialisation and regional diversification in the way the principles of S3 are suggesting (Foray 2014). Interestingly, the most profound entrepreneurial skill that these firms have developed over years, is that they know how to operate in isolation, without the support of any institutional mechanism. In the sample, we found a widespread acceptance on the following words of a local entrepreneur:

Entrepreneurs have learned to work and run their businesses alone, it's like an one-man show, they don't expect support from elsewhere, as this is out of their mentality. It's hard for them to change their business culture from one day to another. I'm not sure if this is good or bad (KOCr15, 2015)

In the responses, we have also recorded other types of entrepreneurial capabilities which comprise a mixture of organisational skills such as the effective use of business intuition, knowledge of market and experience and understanding of competition. Business intuition is ranked as the most common leadership skill of the typical entrepreneur, as it appears more frequently in the responses. To highlight the value of business intuition in local entrepreneurial policymaking, an entrepreneur from the Cretan manufacturing sector, says:

There many traditional entrepreneurs who use their personal intuition when they make business decisions with entrepreneurial risks, for example an investment (KOCr15, 2015)

Additionally, there are cases where previous business failure and learning have also contributed to the development of good entrepreneurial capabilities. In this respect, a CM interviewee mentions:

People now are more experienced and this was gained from the previous innovation and entrepreneurial policies which in fact were not that successful, and due to this failure, people have been trained and are now more prepared to deal with innovation and entrepreneurship (MPCM34, 2015)

To summarise a list of the most commonly found characteristics of firms' entrepreneurship in Crete and CM, we created Table 8.4. The findings from this table are the outcome of the analysis performed in the answers we have collected for a couple of questions which aimed at identifying and understanding the particularities of local entrepreneurship. The results are representative for both regions, given that we have collected and analysed evidence from all three stakeholder groups of our interest (private sector, public sector, academia).

Table 8.4 Most common characteristics of firm-level entrepreneurship

Explanation
– Organisational competences to address low-level entrepreneurship
– Weak ability to take entrepreneurial risks related to innovation and R&D actions
– High level of imitative entrepreneurship
– Entrepreneur isolation
– High business institution and relatively good understanding of markets and competition
– Necessity-driven entrepreneurship

Source: Author

Concerning the type of entrepreneurship, the respondents stress also the fact that due to the current financial crisis, there is an increase in necessity-driven entrepreneurs who are usually engaged in the identification of non-technological opportunities, (e.g. people who have been fired and received financial compensation use this money to start their own businesses as they do not have any other alternatives). The ability to identify non-technological opportunities (in the sense that great opportunities are not raised due to strong innovative applications or because of the uptake of new technologies) was developed in the context of necessity entrepreneurship (Reynolds et al. 2002) due to two reasons. The first reason is related with a large number of family-owned businesses where family members became entrepreneurs by necessity to run the business of their families. In this case, firms are run by the children of the owner when the later is retired. The second reason is due to many individuals who turned their interest to businesses not to pursue an opportunity but due to the lack of other adequate employment opportunities. In both cases, the development of entrepreneurial capabilities is initiated and motivated by necessity rather than by personal ambitions or business opportunities. Concerning this interesting finding, two of the interviewees say:

From my business occupation and professional experience I can tell you for sure that entrepreneurship in the region of Crete is entrepreneurship out of necessity and not out of choice (FRCr17, 2015)

There is entrepreneurship in the period of crisis but this is because people do not have an alternative, so we are talking about necessity entrepreneurs (KACr12, 2015)

Apart from the above types of entrepreneurial capacity which are based on more traditional business practices and behaviours, we have also recognised a limited number of cases with more advanced business competences. Such competences are normally developed at an individual level through individual and team working. The main characteristics of these skills is that business decision-making is mainly based on

the introduction and evaluation of new knowledge and critical information. In this respect, getting access into new knowledge is an increasingly significant component for the formation and development of effective entrepreneurial capabilities. Most of the entrepreneurs belonging in this category possess advanced information technology (IT) skills which have allowed them to use the applications of new technology to look for new business opportunities. Most of these entrepreneurs run start-ups, usually in different high-tech sectors. Examples in the case studies include new business ventures hosted in business incubators. The manager of the incubator in Heraklion mentions for these companies:

We host innovative firms in our incubators, some of them develop very competitive products or services. Usually, they are technology start-ups and spin-offs from the university of Crete, FORTH or from elsewhere. These guys use advanced technology and seem to have a good perception around innovation (SACr1, 2014)

Meso-level

8.2.4.3 Regional-level entrepreneurship

At the regional level, we examine entrepreneurial capabilities by investigating the capacity of the regions to understand local patterns of entrepreneurship and develop institutional mechanisms to support the promotion of entrepreneurial activities in diverse business sectors within and beyond the regional boundaries. As a general finding we may note the weak ability of the regional mechanisms to map the entrepreneurial activity of the regions, in the sense that there are no official data to indicate its nature (tendency, characteristics, types, orientation, key players, number of new ventures) and degree of intensity (entrepreneurial frequency, level of risk-taking etc). As a result, the existing entrepreneurial support coming from institutional sources restricts the development of regional entrepreneurship. From a narrower perspective, the analysis identifies differences between the capabilities for the enhancement of

intra-regional entrepreneurial activities and capabilities for the promotion of cross-border entrepreneurship. Therefore, we present them separately.

(A) Capacity for cross-border entrepreneurship

The respondents identify a relatively good ability of the regions to organise entrepreneurial missions abroad and take part in cross-regional cooperation agreements. In this respect, the capacity of the regions to support entrepreneurial actions takes a systemic dimension which embodies a collective endeavour to exploit new entrepreneurial ventures. As an example, entrepreneurs from the interviews refer to the organisational skills (e.g. know-how to promote local products abroad) that a number of regional authorities have developed through their continuous participation in various entrepreneurial exhibitions. AZCr6 (2014) says:

Several regional initiatives are now being launched to promote local entrepreneurship abroad through the participation of the region in international exhibitions, business missions etc (AZCr6, 2014)

Our data exhibits a relatively good capacity of regional bodies to include mechanisms to support entrepreneurship. However, they mention that the outcome is not always the desired one as these actions tend to lack connectivity with actual business activity (e.g. practices conducted by business representatives or public servants cannot replace entrepreneurs' knowledge and experience), and usually fail to sustain a critical mass by embracing a large number of local enterprises. This challenge is highlighted in the following quotes:

The problem is that regional authorities can't always bring the results that entrepreneurs themselves could bring for their companies, when participating in foreign exhibitions or other similar entrepreneurial events (AZCr6, 2014)

Other regional competences which support the enhancement of entrepreneurship and facilitate cross-regional connectivity, contain the supportive mechanisms which have been established by the regions abroad. A recent example is the operation of an info-office of the region of Crete in Brussels, which seeks to keep Crete connected with other European regions. This initiative reveals also a degree of decentralisation, in the sense that it is possible for regional authorities to have a direct interaction with EU-level governance. In this respect, Crete has improved its administrative abilities by connecting its local authorities with European policies and structures.

(B) Capacity for intra-regional entrepreneurship

Relating to the capacity of the regions to encourage entrepreneurship within and across different business sectors, the respondents found the existing mechanisms at a relatively low level. While regions possess a short of capacity to support innovation-driven actions in local entrepreneurship, (mainly through the implementation of horizontal policy actions, e.g. entrepreneurial programmes funded by national and regional money), the potential of this ability is limited in the sense that it does not have continuity. Once programmes come to an end, organisational skills and competences stop functioning. The main problem we have seen from the responses is that the role of entrepreneurship has never been adopted in the policy agenda as a regional-level phenomenon, which should be treated strategically. According to the responses, addressing entrepreneurship in a strategic way, means to prioritise the creation of an entrepreneurial mind-set that will constantly support local actors develop their business ventures. An indicative quote from a financial sector interviewee is presented below:

Continuation in entrepreneurial ventures is a big word. To support business activity we should first introduce a better entrepreneurial environment in which firms can feel confident to run their businesses, an entrepreneurial environment which will be stable no matter of the

political power, firms won't make serious investments unless they feel safe (MICr16, 2015)

The fact that Greek regions have very weak legitimate roles to create tailor-made rules according to their own needs, has been identified as a critical barrier for the strategic promotion of local entrepreneurship. The respondent's words show the lack of entrepreneurial policy and the system-level constraints of entrepreneurial action in both regional environments.

I'm not sure I can find many effective mechanisms at the regional level to support local entrepreneurship in a systematic and collective way. You know, the truth is that regions were normally dealing with infrastructures, road connections, buildings, bridges and not with the promotion of entrepreneurship (SOCM37, 2015)

The above quote has been acknowledged in most of the responses and reveal a general attitude on the capacity of regional-level entrepreneurship. However, in spite of these particular patterns of entrepreneurial activity, the analysis indicates the creation and development of a new series of organisational skills, geared to enhance and promote local entrepreneurship. These skills have been mainly developed by certain regional authorities and include human resources upgrades and professional training, as well as collective efforts for institutional networking among private and public sector organisations. These initiatives are organised in the context of the S3 framework, with the objective of supporting regional entrepreneurship by setting up a new entrepreneurial centre. This new centre will be established in both regions to support local entrepreneurship through regionally-based initiatives. At the time of writing, mid-2018, regional authorities are closely working towards setting this new entrepreneurial mechanism.

8.2.5 Administrative and governance capabilities

Regarding the administrative capabilities of the regions, 14 out of 50 responses indicate that certain regional authorities, such as the local managing authorities and other administrative units related to regional policymaking, have developed inherent organisational skills to manage and monitor the development of innovation-related policies and R&D projects. Based on the view of the interviewees, such skills include project management techniques, know-how to manage national and EU funds (e.g. EU structural funds), understanding of formal rules and procedures in public tendering (e.g. e-procurement policies, calls for tenders in the context of large-scale projects) etc. Apparently, all these organisational competencies are relevant and useful for the development of S3. However, we have captured a general perception which raises the urgency for further improvements, aimed at reducing bureaucracy, recovering public sector trust and tackling public corruption. Gradual improvements in these critical areas will help addressing the overlap between national authorities and regional structures currently existing in the context of S3, as discussed in chapter 7.

Furthermore, the regional autonomy to implement tailor-made innovation policies at the regional level, remains at low levels in the sense that regions possess limited political, constitutional and executive power to induce appropriate structural changes for implementing regional innovation policies. The interviews highlighted that such changes should include the ability to modify and apply the national legislation according to several regional needs and place-specific particularities. For example, even the S3 tools which are available to regulate the finances of S3 are nationally-based, and therefore dependent on central policy actions. However, it is important to note that from 2010 onwards, the national political system allowed the election of the regional governor directly from people, which according to the interviews, provided additional regional autonomy and control over the entire local government²⁶. In practice, regional policy design began to take an actual role when the regional governor was elected by

²⁶ Note: previously, regional governors were appointed by the Minister of Interior

people. Previously, innovation policy was common for each region of the country regardless local needs, characteristics and particularities. In this context, the need to design new indicators at the regional level to monitor and assess policy implementation was increased importantly.

8.3 PART B: Capabilities required at the micro- and meso-level

In this section we present the empirical findings concerning the second part of RQ2, which is intended to investigate what capabilities are required to support the development of S3 in Crete and CM. The analysis is based on the respondents' views and discloses their answers concerning a series of place-specific enablers in supporting the governance and institutions of S3. We assemble a number of organisational and regional competences and group them into six core types of capacity building. Table 8.5 summarises the statistics of each type of capability based on the frequency of the interview responses. The interviews indicate that each type of capability has a particular complementary role to play in the implementation of S3, and increases the possibilities to affect its policy outcome in the long-run.

Table 8.5 Number of interview responses on what capabilities are required for S3 implementation

Capacity Description	No. of respondents				Percentage ^(*)		
	Crete	CM	TOTAL	Quotes	Crete	CM	TOTAL
I Capacity to map regional dynamics	11	10	21	36	37%	50%	42%
II Capacity for decentralisation and regional autonomy	15	12	27	90	50%	60%	54%
III Capacity to develop regional communication, networking and clustering	14	13	27	61	47%	65%	54%
IV Capacity to link cross-sectoral activities	5	3	8	10	17%	15%	16%
V Capacity to understand and upgrade firms' technological and innovation potential	9	6	15	63	30%	30%	30%
VI Capacity to enhance local entrepreneurship							
(a) Embedding enterprise and entrepreneurial skills in academia	9	10	19	42	30%	50%	38%
(b) Leverage private capital for entrepreneurial investments	6	4	10	18	20%	20%	20%
(c) Competences to design new place-based tools to support S3 entrepreneurial capacity	13	10	23	69	43%	50%	46%

^(*)Based on a total number of 50 interviews: Crete=30, CM=20

Source: Author

8.3.1 Capacity I: Capacity to map regional dynamics

This capacity is related with the need to understand the framework in which innovation actions are taking place. This view is documented in a representative quote provided by a Cretan policymaker:

The regional innovation system of Crete has been never analysed in detail to understand how S3 can be better designed and implemented in it. Are we familiar with the particularities of the regional innovation system of Crete? I don't think so. (KACr48, 2017)

The words of the respondent show that prior to any endeavour to change and improve the governance of S3, it is important to build capacities suitable to understand the environment in which innovation policy takes place. The data evidence that the capacity to map regional dynamics takes two central dimensions. The first refers to the competences needed to assess previous regional innovation policies. Several respondents point out what a policymaker from CM simply says:

Previous innovation policies have not been yet evaluated, their impact is still unknown. So, how to design and implement new policies if you don't know what went well or wrong in your previous policy frameworks (TRCM35, 2015)

The process of evaluating the impact of previous policies at the sub-national level requires the introduction of tailor-made indicators and the actual engagement of local institutional bodies (e.g. the Regional Innovation Council). The second dimension is linked with competences required for the assessment of the entrepreneurial potential of the regions. To underpin this view, two CM respondents mention:

What is missing now is the collection of empirical data, we need to perform an empirical-based investigation to understand the developmental potential of the region (SACM38, 2015).

What is also required for smart specialisation is to allocate experts who will have a deep knowledge of the localities of each regional ecosystem, its entrepreneurial capacity and potential, for example how many innovative companies exist, in what sectors etc (MPCM34, 2015)

Both quotes underline the need to map regional dynamics with an emphasis on entrepreneurial activity. In this respect, it is important to classify entrepreneurial actors

into homogeneous groups to facilitate S3 implementation. The analysis suggests that there is a growing need for the regions to emphasise the development of endogenous capabilities to assess entrepreneurial firms and classify them into homogeneous groups for S3 policy implementation. The principles of this suggestion are derived from two mainstreams of findings. The first relies on a large number of responses (approximately 90% of our cohort of interviewees) which point out that not all firms are capable of taking an active role in the S3 implementation, and therefore, we should identify and engage the most proper ones. The idea of selecting and targeting innovative firms from a variety of industries to develop S3 is supported by an important part of the innovation literature (Isaksen and Trippel 2014). The main argument of this view is that it would be possibly useless to target firms which lack fundamental resources and critical organisational competencies for implementing S3, as it is very unlikely for them to meet the objectives of S3 (e.g. to be able to identify and exploit new entrepreneurial opportunities, diversify their products, get access into new specialised markets etc). Firms with these characteristics are usually found in the Zero-level capability group (see Table 8.3), which shows very low innovation and technological potential. The second finding is linked with a relatively high tendency in the responses which covers almost 60% of the sample responses. It emphasises the need to achieve a deep understanding of the diverse types of capacity and potential that all entrepreneurial firms possess. In relation to this, KO CM21 (2015) says:

In order to implement an effective regional innovation strategy, it's crucial to have a solid understanding of your business environment and its traits, the competitive advantage of your region, the critical mass, the nature and types of the local companies (KO CM21, 2015)

It is broadly highlighted that capacity building should be understood as a systemic process. This will assist the process of designing additional policy interventions, aligned to support the implementation of S3 through a better policy governance approach. The development and exploitation of regionally-based

competencies appropriate to assess different types of firms' performance (e.g. technological, innovation, entrepreneurial etc), will form regions' capability to group local firms into different performance groups for policymaking and implementation. We believe that the formation of classification capabilities at the meso-level (ability to classify entrepreneurial actors into different performance groups), is increasingly important in the sense that it will reveal what endogenous transformation processes should be initiated to facilitate S3 implementation practices. The responses reveal that such processes should be driven by trial-and-error approaches, which allow for effective policy learning. Current regional innovation policies are more likely to follow a horizontal approach in both the design and implementation phases, neglecting the diversity of firms' abilities and particularities. An R&D manager from a technologically-mature company in the region of Crete says:

I can see that the regional government tries to open new markets in the agro-food sector, for instance in Russia, but this is something that we don't really want from the region, since we can do it ourselves. We are forward anyway, so it doesn't make sense for us such a policy initiative. We would like to see other types of support for our company (MECr13, 2015)

This view follows the rationale in which different performance groups require different policy approaches and actions. From a practical perspective, there is a common line in the responses which underpins that once firms are classified into homogeneous performance groups, S3 policymakers will be more capable to understand what policy intervention is most relevant for different types of firms for the prioritisation of activities that are likely to boost regional diversity. For example, what policy actions are required to will assist the process of accumulating and ensuring firms' critical mass discussed in chapter 7, section 7.4.2.4. Critical questions with policy interest can be then answered analytically. For example, reflecting on the analysis we have done in section 8.2.1, a couple of questions are raised: what policy priorities

would be most appropriate in the S3 context to augment the ability of technologically mature companies to diversify into new products or markets by using external knowledge? Similarly, what policy-level actions are required to facilitate the development of science-business networks between universities and learners, in order for the latter to foster local entrepreneurship and become top-leaders in the region? The need to map firms' capabilities, create different performance groups and design tailor-made action plans is disclosed in our discussion with a local policymaker in CM.

I think one needs to categorise companies, even within the same sector, into different groups. We need different models to support groups of firms with different performance (KOCM21, 2015)

The development of Capacity I requires the co-existence of a number of competences and skills analysed previously in this section. Table 8.6 summarises a core set of competencies that should be developed regionally to facilitate capacity building for mapping regional dynamics.

Table 8.6 Competences summary for Capacity I

Competences needed at the regional level
- Assess the impact of previous innovation policy frameworks
- Mobilise actual engagement of local institutional bodies
- Competence to evaluate local actors' performance on the basis of innovation and technology (public and private)

Source: Author

8.3.2 Capacity II: Capacity for decentralisation and regional autonomy

This capacity relates to efforts for governance upgrading at the sub-national level and refers to the development of negotiation competences to make the required institutional changes in regional autonomy discussed in chapter 7. We analyse the importance of building bargaining capabilities for the restructuring of the regional governance systems in Crete and CM, towards facilitating the development of S3. This process addresses the territorial governance challenge and it is linked with the

development of competences for the re-organisation of the regional setting. Moreover, the respondents point out the need to increase regional autonomy with the objective of supporting the initiation of place-based practices (e.g. self-identification processes), and allowing regions to implement their specialisation objectives. They specify the degree of regional autonomy as a central element for the effective development of S3, given the limited power of the regions to currently govern and implement their strategic priorities. Recent studies define Greece as a highly centralised state in which regions have little autonomy to implement smart specialisation (Marques and Morgan 2018). In our case, examples of S3 governance failure include the inefficiency which derives from a strong regional dependency on national rulemaking. One of the S3 coordinators in the region of Crete says:

There are only a few things that our region can make alone with regard to smart specialisation strategies, because almost any critical action is supervised and governed centrally. For example, state funding and different forms of financial tools rely completely on national platforms, so you are not able to develop you own regional financial tools. You are dependent on the effectiveness of national structures - if they work well, you work well too, if not you can't proceed with your plans (KACr42, 2017)

In this respect, some of the respondents mention that Crete and CM must develop a new policy role for the shaping of the national institutional framework in the S3 context. This new role should rely on the creation and deployment of endogenous negotiation competences, which will gradually form the augmented bargaining capacity of regions against the centralised state and its inherent inefficiencies (e.g. bureaucracy, time-consuming processes etc). Through these competences regions will develop opportunities to move from top-down approaches to bottom-up practices as broadly suggested by the regional innovation policy literature (Cooke et al. 2011; McCann and Ortega-Argiles 2013a; Asheim and Cooke 2011; Uyarra 2009). Interestingly, over half of the respondents (50% for Crete and 60% for CM) have expressed the perception that

the implementation of S3 cannot be effectively achieved unless regions increase their capacity for regional autonomy. In their view, increases in regional autonomy are of a foremost importance for a successful implementation of S3, as they will gradually improve the transformative ability of the region to rethink the existing national framework and propose a new tailor-made institutional framework, in which the realisation of S3 can be better facilitated. In this new governance framework, regions should be able to develop legislative and administrative competences, geared to meet the objectives of S3. Using NVivo codes related to decentralisation and regional autonomy, we created four main categories which indicate a list of tailor-made policy initiatives to be addressed in the S3 context from a bottom-up approach according to the most frequent responses. The results are summarised in Table 8.7. Most of them are expected to have a direct impact on innovation policy making, given that they are seen by the interviewees as an enabler to successful implementation.

Table 8.7 Results on tailor-made policy initiatives related to regional autonomy

Policy action at the regional level
– Option for additional policy power of regional authorities to manage local funding regionally and reduce bureaucratic and time-consuming processes
– Authorisation of regional authorities to evaluate and monitor innovation policies at the regional level through the design of targeted regional indicators
– Provision of tax incentives in selected S3 domains at the sub-national level to promote local entrepreneurship and attract foreign direct investments
– Motivations for the mobility and attraction of specialised workforce in specific areas of regional specialisations

Source: Author

The degree of regional autonomy can be gradually increased through the development of decentralisation competencies, which will bargain national-level political power and allow for different institutional structures at the sub-national level to promote and enhance regional diversification. Obviously, this is not an easy task, as the central government seeks to keep political power at national levels. However, what is

highlighted as a possibility is to increase regional autonomy gradually, by introducing pilot changes in one or two areas of S3. Addressing this process at a pilot basis will show what administrative opportunities and challenges are emerged for the regions.

The analysis indicates that the creation of regionally-based negotiation competencies should begin prior to S3 design, and co-evolve with other place-specific elements emerged during its realisation. The idea of promoting decentralisation capabilities at the regional level to support regional autonomy and flexibility in the S3 context is adequately captured in the following quotes provided by a member of the Regional Innovation Council of Crete, with an institutional role in developing regional innovation strategies. He says:

If regions are not able to legislate under certain circumstances to facilitate policymaking, we can't really have a proper implementation of smart specialisation. If a region is unable to modify its institutional framework and make legal or other valuable decisions on its own, smart specialisation is an unrealistic scenario. It's not possible to have competitive regions, if they don't have the authority to re-configure their institutional framework according to their needs. In this case, all regions will be in the same position, possessing the same degree of capabilities and innovation potential. For example, it is vital for an insular region like Crete to have the right to offer diesel for shipping in discount of 30%. This option should be both feasible and legal. Accordingly, regions which are good in mining and metals, for example, should have the legitimacy to provide double wages to mining workers (KACr48, 2017)

It is important to clarify that the upgrading of regional autonomy does not automatically mean lesser contribution of the national authorities. On the contrary, we have found that national efforts to support S3 implementation could be further enhanced through the development of specific competences and skills at the national level. One critical type of support proposed by ten responses is the creation of an observatory for the development of S3, geared to assist regions developing their S3 action plans. The observatory could build permanent multi-level structures with complementary roles in providing basic guidance for the design, implementation and

evaluation of S3. Particularly, the interviewees from the public sector mainly highlight the importance of setting a national mechanism which will have the appropriate competences to provide guidance and support in areas where regions cannot perform well.

8.3.3 Capacity III: Capacity to develop regional communication, networking and clustering

The interviews disclose a noteworthy emphasis on the importance of giving a strategic approach in the development of intra-regional co-operation and learning among different local actors, who currently show low networking performance. The respondents support the perception that there are local entrepreneurial firms which possess the potential to improve regional performance, yet these firms should benefit from networking, agglomeration and clustering effects. This process is closely linked with the need to introduce new network policies at the regional level, which will combine different organisational resources to promote key functions of production. At present, as we have discussed in the previous section, most of the local firms operate in isolation and thus little can be achieved at a regional level (see section 8.2.3.1). The urgency to design, create and co-ordinate networking initiatives at the regional level is considered by the respondents as a very important process which is expected to introduce collaborative culture and affect the implementation of S3. The creation of clusters is possible to have a spatial approach with regional, national and supra-national dimension. One of the respondents says:

It is important to take a small number of companies and try to help them create synergies with each other to develop joint collaborative efforts with the aim of identifying what breakthrough could be generated in the areas of their expertise (TRCr9, 2014)

This is an interactive process in which the formation of new regionally-based clusters and interactive communication platforms is on the top level of the priority list, aiming at improving firms' networking mentality and, gradually, re-building trust among different entrepreneurial actors. Both Cretan and CM respondents identify S3 as a significant opportunity to localise and formulate a bottom-up need for the creation of regional networks and clusters, through the opportunities emerged from the interaction of entrepreneurial actors, knowledge creators and policy makers who take part in the entrepreneurial discovery. In this respect, the entrepreneurial discovery is not only considered as a productive process for the discovery of potential specialisations in the regions, but also as an institutional and collective means for the enabling of regional clustering and networking. These networking schemes should predict the incorporation of flexible management structures, whose absence in previous efforts was identified from the analysis as one of the most important reasons that previous clustering and networking policies failed to form effective clusters or networks.

The idea of clustering is seen as a key tool for cross-sectoral networking among diverse regional actors, whose co-existence and co-development in certain agglomeration schemes is possible to support further the realisation of S3. However, while a series of policy studies highlight the importance of clustering for inter- and intra-regional cooperation in the S3 context (EU 2016), in our findings we saw that building strategic cluster capabilities is also very important for addressing other policy actions which are closely linked to S3. This idea derives from the perception that collective business endeavours which initiate and evolve within local networks or clusters, are most likely to bring better and more integrated policy results and recommendations, than single actions undertaken by individual firms. For example, high-level policymakers point out that it would be more politically correct and more acceptable for the regional governor of Crete to ask from the central government for additional autonomy and governance flexibility for S3 policy action, if justification of

need could be based on collective rather than individual outcomes. In this respect, doing things collectively is better secured through clusters and organised networks, which take an institutional dimension in the regional setting.

The adoption of the principles of this new dimension of networking and clustering during S3, could bring additional policy improvements both in the design and implementation phase and, therefore, better policy results. Furthermore, concerning the design phase, there are responses which see the inefficiency of the regional authorities to facilitate S3 as a problem, derived from the limited power of the regional government to bring about institutional change at the regional level. The idea that such problems might be better tackled through collective and powerful local networking is revealed by the following quote, which shows the potential for setting a better local policy design mechanism through the provision of tax incentives:

The region lacks powerful business networks or strong industrial associations which could claim from the national politicians tax reductions in specific business sectors to attract foreign investments and support regional development (KACr48, 2017)

The importance of building strategic cluster capabilities is more apparent in the implementation of smart specialisation, given that S3 actions have been designed to promote funding for joint actions (Region of Crete 2015; Region of CM 2015)

Along with regional networks and clusters, the analysis reveals the significance of promoting communication platforms for research collaborations, which could have a supplementary role in the process of networking S3 actors. In the respondents' view, the development of communication platforms could progressively facilitate research collaborations, and therefore embrace science-industry to support a continuous and more strategic dialogue between universities and firms, which as discussed in the first part of this chapter, it is still missing from the regional agenda. The respondents mention that particularly in the case of Crete which is a small region with insular characteristics, local entrepreneurial actors are likely to possess a greater potential in

developing pilot networks, which later can be transformed into research, technological or business clusters, due to the advantages of location-specific factors. This idea derives from the benefits emerging from the spatial proximity and the concentration of public R&D intensity highlighted in the responses in previous sections of this chapter. The standardisation of olive oil and the organisation of local farmers to promote their products in a collective way have been cited as examples of local business activities which should be conducted collectively through networks and clusters. A financial sector expert from Crete mentions:

One could find all these small olive oil companies, and try to help them create joint business networks in order to be able to attract large customers and get access into new markets (MICr16, 2015)

The practice of cluster policies is also seen as a driving force in the development of a collaborative culture which is currently missing at both an organisational and regional level. The creation of clusters should follow a learning approach in which firms, universities and other key regional actors should be trained towards rebuilding their connections for interdisciplinary knowledge exchange. This objective, however, requires time-consuming processes and by no means it can be seen as a straightforward process. A list of competences towards this direction has been analysed in this section and summarised in Table 8.8, which shows the theme notes generated in NVivo.

Table 8.8 Key competences for building regional networking and clustering capacity

Competences
– competences to re-build trust among different entrepreneurial actors
– ability to exploit the opportunities raised from the entrepreneurial discovery to enable regional clustering and networking
– ability to exploit collective and powerful local networking to fulfil S3 policy-related objectives (e.g. additional authority and autonomy at the regional level)
– design and manage interactive communication platforms to facilitate inter-organisational networking, as a supplementary action in S3

Source: Author

8.3.4 Capacity IV: Capacity to link cross-sectoral activities

The analysis identifies responses which are linked with the potential of regions to connect different but related business activities, with the objective of generating cross-sectoral innovation and achieve product diversification. The basic idea of this finding relies on previous research work on industrial branching, which examines the interplay between relatedness and regional diversification (Boschma and Capone 2015; Neffke, Henning, and Boschma 2011). Moreover, it highlights the need for developing and exploiting a combination of networking competences which will gradually compose a regionally-based capacity to identify and interconnect cross-sectoral business activities that are well related with each other, but still remain disconnected. In the Cretan and CM context, there is a need for this type of capacity building to be oriented towards building competences which are likely to support the identification of fragmented business activities which however reflect the conditions to get embraced by others (e.g. single business activities which possess entrepreneurial potential if they are organised and managed collectively). This view goes beyond the limits of traditional practices conducted in previous innovation actions, in which institutional support was only given on specific firms, neglecting the importance of cross-sectoral interaction. However, this old view seems to be changing in the new S3 context, given that disruptive innovation is likely to appear in cross-industry endeavours (Christensen 2015). We present the words of a professor from the University of Crete:

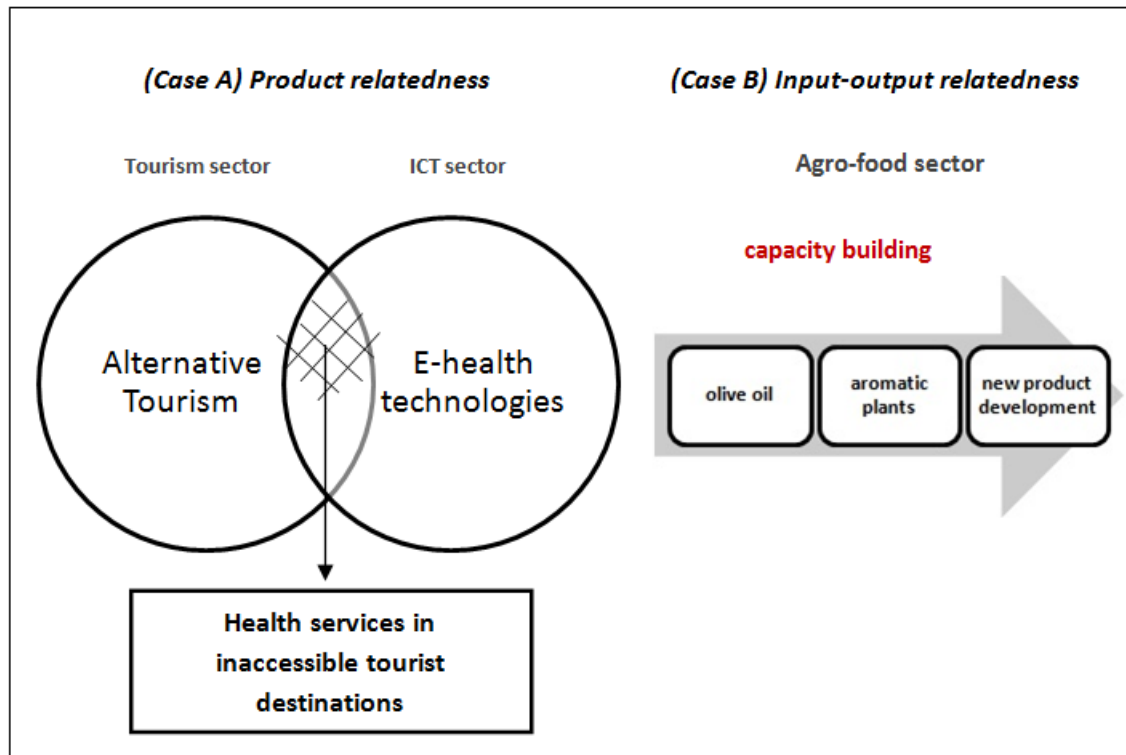
I strongly believe that it is now much clearer that innovation is more likely to appear in interdisciplinary ventures (TSCr24, 2015)

This is probably why we have collected responses which suggest the encouragement of S3 funding in activities which promote cross-sectoral collaboration. For example, TRCM35 (2015) states:

It would be good to receive more funding if you are able to combine 2 or 3 different areas of interest in one single project (TRCM35, 2015)

The evidence from observational research in Crete (participation in consultation events for the entrepreneurial discovery), reveals the collective efforts of the S3 co-ordinator to stimulate the promotion of cross-sectoral projects (e.g. explicitly discussed in speeches and presentations). The fact that cross-industry collaboration was extensively indicated as an additional enabler for getting access in S3 funding, it highlights the growing importance of creating and developing capabilities for inter-sectoral connectivity. We refer to a number of local cases from the agro-food sector which have been highlighted by the respondents during the interviews and rely on the need to deploy regional skills to stimulate product relatedness (Neffke et al. 2014) and input-output relatedness among different industries (Essletzbichler 2015). In the findings, examples of product relatedness include the combination of tourism with electronic health services in hinterland or other inaccessible tourist destinations, while input-output relatedness among similar industries embrace the combination of aromatic plants with olive oil, (in this case aromatic plants take a lonely business journey in the marketplace, while olive oil dominates the agro-food market). A diagrammatic illustration of the role of capacity building in linking cross-sectoral activities (product relatedness and input-output relatedness) in the case study is conceptualised in Figure 8.1.

Figure 8.1 Linking cross-sectoral related activities



Source: Author

In the first case, the combination of two related products/services (alternative forms of tourism and e-health) from two different economic domains (tourism and ICT) is expected to spark creativity and innovation in specific business areas (health services in inaccessible tourist destinations). Likewise, the complementarity of two local products (olive oil and aromatic plants) from two related sectors (olive oil production and cultivation of medicinal and aromatic plants) can lead to new product development with significant potential in the global market. Interestingly, the value of creating an inter-sectoral potential within the S3 framework is also recognised by MICr16 (2015) who points out that the local bank of Crete is highly interested in identifying and funding innovations which emerge from cross-sectoral activities and interactions of entrepreneurial actors from different business sectors. We create Table 8.9 to resume

the main competences needed to build capabilities for linking cross-sectoral related activities.

Table 8.9 Capacity to connect related, yet disconnected business activities

Competences
- Ability to recognise industrial and sectoral diversity
- Ability to identify related but disconnected business activities for potential networking
- Competency to link fragmented entrepreneurial activities, using several channel linkages

Source: Author

8.3.5 Capacity V: Capacity to understand and upgrade firms' T&I potential

Evidenced opinion of various interviewees suggests that the case study regions must first measure and understand firms' technological and innovation capabilities in depth, and then design and develop their S3 action plans. To do this, it is essential to motivate bottom-up practices to exploit regional resources instead of using again national or EU structures (e.g. central indicators), which are appropriate to provide only a rather general view on Innovation and Technological (I+T) performance. This view is linked with the idea introduced in Capacity I, which analyses the importance of developing assessment and classification capabilities at the regional level. Understanding firms' organisational capabilities in a particular local context, is seen as a complementary capability, that should be developed to support and enable the implementation of S3 in Crete and CM. This is critical because S3 priorities should evolve in response to innovation and technological capabilities that currently exist or might exist after proper realignment.

As discussed previously, we found a large diversity in the way in which local firms develop innovation competences and technological knowledge and, therefore, their potential to deploy appropriate capabilities and take an active role in the S3 practices varies notably (see capacity classification in 8.2.1). This finding reveals the

need for developing regionally-based capabilities, suitable to map the ability of diverse local entrepreneurial actors to innovate and exploit new technological opportunities. In this process, the design of new tailor-made indicators to assess regional innovation and technological performance is seen by almost all of the respondents as a required condition which should be made before, during and after the implementation of S3. Common findings from Cretan and CM datasets reveal that the existing indicators (e.g. GERD, BERD, no. of patent holders etc) have been designed centrally by the EU and, in fact, are not relevant to sufficiently measure and analyse patterns in regional innovation input and output. While previous innovation policymaking failed to design appropriate indicators, in the S3 context where practices and evaluations should be repeatedly conducted, the presence of place-based indicators to assess fluctuations in firms' technological and innovation dynamics is crucial. In this respect, it is important to abandon previous policy shortcomings as illustrated in the quotes provided by a representative of the Chamber of Commerce and Industry in CM:

In previous policy frameworks indicators were more focused on exploring how funding was absorbed. In this programming period we need to identify a proper mechanism to see what's going on with the impact of this funding, what's going on with the impact of our policies (VLCM36, 2015)

Obviously, the idea of supporting capacity building in the context of S3 is not new. Contrariwise, it has been extensively cited in the literature (Foray 2016; McCann, van Oort, and Goddard 2016; Asheim and Grillitsch 2015; Gianelle et al. 2016). However, what comes out from the analysis with a policy-level interest, is that the process of achieving a deep understanding of firms' competences is essential for capacity building, which should be conducted prior to any S3 action, only if relevant indicators are put in place. This will allow the introduction of new policy initiatives, geared to prepare as many firms as possible for a productive participation in the entrepreneurial discovery and then in the implementation phase. In practice, capacity

building efforts which are conducted before S3 would help policy designers setting complementary policy actions, geared to improve organisational capabilities in different innovation-performance groups, and prepare therefore a variety of firms to participate in the development of S3. There is high consensus in the interviews (approximately 60%), that progress in understanding what particular competencies and knowledge skills have been developed by local firms over years, will lead to more targeted regional innovation policies, aiming at supporting companies developing their own learning capabilities. For instance, entrepreneurial actors with very low capacities can receive tailor-made support to catch-up with basic technological trends, firms with weak technological and innovation capabilities to start building their own R&D capacities, independent R&D firms or technologically-mature companies to retain and improve further their research infrastructures and so on so forth. For example, to show how an understanding of firm-level innovation performance could practically support S3 policymaking for technologically mature companies, we use again the view of an R&D manager from the industrial sector of Crete who points out:

I can see that the regional government tries to open new markets in the agro-food sector, for instance in Russia, but this is something that we don't really want from the region, since we can do it ourselves. We would like to see other types of support for our company (MECr13, 2015)

We know from previous empirical studies that critical mass does matter for smart specialisation (Landabaso, Georghiou, et al. 2014) and for economic development in general (Iammarino, Rodriguez-Pose, and Storper 2017). Thus, it is increasingly important to engage a large number of firms and secure that they are capable to meet the requirements of S3 in a progressive way (e.g. set intra- and inter-regional technological collaborations to generate innovation-driven growth in specialised areas of the local economy). Practically speaking, it is not realistic to execute regional innovation policies with only a few local companies. Besides the

rational of smart specialisation goes beyond the process of picking winners (Foray, David, and Hall 2011; Asheim, Boschma, and Cooke 2011), or selecting merely regional champions (Hughes 2012). This implies that other firms with less-developed organisational skills and innovation competences should be also motivated and engaged in the S3 processes. KOCCM18 (2015) says:

It seems that the more companies we have the most effective results we will achieve, because the main aim is not to provide the opportunities to a small number of companies to innovate but to have a more productive and competitive regional innovation system, So if we support only 5% of the companies which innovative, I'm afraid we haven't succeed at all. It seems like creating a small agglomeration or a technology neighbourhood which is fine but definitely not the objective of smart specialisation strategy. Therefore, we should look for a wide participation of private institutes, however, we should not expect that the level of support and its outcome will be the same for all institutions participating in the smart specialisation practices, the level or intensity of support could be stronger in areas or institutions that one could expect more, without excluding companies which have demonstrated poor or even none innovative activity in the past (KOCCM18, 2015)

In this regard, the interviewees highlight the idea of supporting horizontally all entrepreneurial actors to upgrade their innovation and technological skills. This process could include tailor-made training and targeted support to assist a large number of firms to improve their organisational competencies and build on new capabilities inspired by learning and knowledge exploitation. Interestingly, this idea does not prompt the provision of support at an individual level (e.g. target single firms); rather, it promotes the logic of addressing the whole region through the different groups of homogeneous firms (e.g. firms with similar innovation skills and needs). The coordinators of S3 we have interviewed in both regions articulate a clear view on this. The process of mapping firms' innovation and technological capabilities should result in the formation of different performance groups, in which the S3 implementation should be based. The idea of designing S3 policies which will address groups of homogenous firms

(clusters of firms), instead of single entrepreneurial actors (e.g. market leaders who will possibly motivate later the engagement of other local firms to follow and take an active role), is found broadly in the results. While there are ideas in the smart specialisation literature which suggest that S3 can be initiated by a small number of local actors (at least in the beginning), we highlight the value of engaging an expanded number of firms in the capacity building process. The idea of promoting large-scale support for the enhancement of entrepreneurial capabilities was evidenced in regional policymaking through the work of Rosiello et al. (2013), who postulated it as a pre-condition for policy action in the S3 context. In line with this view, the respondents mention that the realisation of S3 should be based on a massive participation of local firms, which however, should not be targeted and addressed individually (e.g. funding firms with advanced innovation capacities only), as it happened in previous regional innovation programmes, but rather at groups. To sum up, we present Table 8.10 which outlines the basic principles analysed and discussed in Capacity V.

Table 8.10 Competences to map firms' technological and innovation potential

Competences
- Introduce new regional indicators to assess and understand the particularities of firm-level innovativeness Provide tailor-made support
- Provide tailor-made training and targeted support
- Assess organisational competences and knowledge skills for better policy intervention
- Take over large-scale initiatives for the enhancement of firms capabilities

Source: Author

8.3.6 Capacity VI: Capacity to enhance local entrepreneurship

The findings highlight the importance of improving entrepreneurial capabilities at both the level of firms and regions and emphasise a series of competences that could progressively upgrade organisational and regional capacities. These competences refer to institutional changes and more targeted public policies.

8.3.6.1 Embedding enterprise and entrepreneurial skills in academia

The need to modernise academic entrepreneurship receives widespread acceptance in the findings, given that it is seen as an increasingly important means to produce research-based innovations. As research is driven by universities and research centres in the selected regions, their role in supporting industry-academia interactions is critical. The interviews indicate the need to improve university structures to get closer to the local business community and affect S3 policy outcome through industry-academia partnerships. However, this is not the only suggested action. They also point the need to transform academic bodies into more entrepreneurship-friendly organisations that would be able to build inherent entrepreneurial competences and co-ordinate entrepreneurial capacities such as the commercialisation of research outcomes, the development of productive routes to protect and manage IPRs etc. These sets of findings are intended to highlight the increasing value of creating regionally-based spin-offs and university start-ups in the implementation of S3. Because it is spin-off companies with a strong association with academia, that are expected to shape S3 practices in Crete and CM.

The analysis indicates also the imperative to leave behind anachronistic attitudes which still view universities and entrepreneurial activity as two different and unrelated aspects of the local community. We saw that the process of embedding entrepreneurship in universities and research centres is still a big challenge for Cretan and CM academe, which suffers from low levels of entrepreneurial awareness. To show the difficulty involved in changing university attitude on entrepreneurship, a professor from the Technological Institute of Crete points out:

Please don't forget all these problems with entrepreneurship are very recent. It was only 15 years ago that academics and students considered academic entrepreneurial activity with scepticism, academic entrepreneurship was totally unwanted, it was forbidden for the majority of the Greek academic institutions. This is something that needs a lot of time to change (TSCr24, 2015)

Despite the efforts to give universities a more entrepreneurial orientation, the respondents tend to mention that university entrepreneurship is still underdeveloped and non-institutionalised, in the sense that internal institutions and university norms which regulate entrepreneurial activity remain vague. Examples of institutional vagueness and collective inertia include the absence of permanent supportive structures to promote entrepreneurship within the university community (e.g. entrepreneurial programmes, TTOs), the lack of incentives for academics to create spin-offs etc. In this respect, S3 policymaking should be partly oriented towards recovering this anachronistic perception. We have elaborated data which shows that the capacity to modernise academic entrepreneurship relies on certain competences that universities should gradually build. Table 8.11 summarises the most frequent responses reported in the context of Crete and CM.

Table 8.11 Competences to promote academic entrepreneurial capacity

Competences
- Building up and institutionalisation of permanent technology transfer and commercialisation mechanisms
- Re-think internal rules and ensure elimination of internal bureaucracy to speed up the creation of start-ups and spin-offs
- Entrepreneurial skills training and rewards
- Initiation of entrepreneurship from down to top
- Support the creation of financial tools, e.g. VCs

Source: Author

8.3.6.2 Leverage private capital for entrepreneurial investments

We emphasise the importance of triggering structural changes to enhance the mobilisation of private capitals in the S3 context. Despite the keen financial crisis and its direct effect in public-private liquidity, we have captured entrepreneurial views which reveal that there are cases in which private money is still available for entrepreneurial investments. Arguably, government money for high-risk investments in the private sector as suggested by Mariana Mazzucato in her entrepreneurial state

book (Mazzucato 2018) is rather an unrealistic scenario in periods of keen financial crisis. This political and economic uncertainty keeps also an effective leveraging of private investments at risk. There are views in the interview datasets which highlight the importance of creating and maintaining a stable environment in which local entrepreneurial actors could attempt new business ventures. A local entrepreneur from Crete says:

If the region seeks to support innovation and high-tech entrepreneurship in the S3 context, I think the first thing is to create and sustain a favourable environment in which companies could take the risk of innovation (KOCr15,2015)

The idea of creating a favourable regional environment for S3 investments goes beyond the obvious and imperative need for policy initiatives aimed at stimulating finance for innovation. The core need is to develop a new innovation-friendly environment in which entrepreneurial actors will routinely mobilise financial resources to start investments in innovation, not because of public funding opportunities, but due to entrepreneurial opportunities that emerge and evolve during the implementation of S3. The responses indicate that this new environment is more likely to trigger technology-driven entrepreneurship if it is re-built on less-bureaucratic processes and promotes simplification of practices, more transparency at both the regional and national level and provision of tax incentives.

8.3.6.3 Competences to design new place-based tools to support S3 entrepreneurial capacity

There is a clear view in the data that regional competences in Crete and CM should be oriented towards the design of a series of new and more effective tools to support local entrepreneurship. The support of complementary entrepreneurial actions is seen by the respondents as an increasingly important process, that should be

addressed simultaneously with the realisation of S3. In their view, such structures include the creation or upgrading of local business incubators, one-stop-shop offices, seed capital services and other tools for the acceleration of innovative entrepreneurship. These tools will support local entrepreneurial ventures by providing a systemic approach. A CM policymaker says:

The previous innovation policy was not systemic, it rather followed a linear approach meaning we actually provided funding to businesses and we expected from them to develop strong entrepreneurial capabilities (KOCM18, 2015)

These words show that previous innovation policies which neglected a systemic approach to innovation are no longer effective, highlighting the need to introduce permanent supportive tools. As analysed in the first part of this chapter, the ability of both regions to enhance and promote local entrepreneurship remains at relatively weak levels. We found that the lack of effective permanent structures and procedures to mobilise entrepreneurial ventures affects S3 practices in two different ways. The first is linked with the difficulties of the regional co-ordinators to implement S3 productively. Particularly, we have captured views which reveal that if entrepreneurial support structures were better organised and pre-embedded in the local entrepreneurial system, the mobilisation of diverse entrepreneurial actors in the discovery process would be much more efficient. Examples of how entrepreneurial structures would support S3 co-ordinators to address the difficulty of the self-identification process include the fast and collective identification of diverse local firms, their easier approach and information etc. The second is associated with the problems that firms themselves as S3 beneficiaries should overcome to take an active role in the implementation phase. The existence of limited entrepreneurial support mechanisms at the regional level does not facilitate the creation of a business collaborative culture which is critical for S3.

An ideal example to show that S3 must not unfold alone but in combination with other territorial policies, comes from the case of Crete. Locally, there is a common attitude which suggests that for S3 to have productive results in the long-term, it is crucial to introduce place-specific entrepreneurial policies to support Crete balance the costs of transportation (e.g. logistics, supply chain costs etc). For example, being an isolated periphery, Crete experiences high costs of transporting raw materials which affects its competitiveness in the long-run. We have also analysed responses which go one step forward by indicating the potential of Crete to develop a pioneer role in shaping the logistics among the Mediterranean countries. In general, we present a mixture of policy actions-tools that have been highlighted by the respondents during interviewing as entrepreneurial capacity enablers in the S3 context (Table 8.12).

Table 8.12 Mixture of policy supportive tools to enhance innovative entrepreneurship

Policy supportive tools
- Enhance the role of regional innovation councils in entrepreneurial actions
- Increase the power of local chambers to support the development of firms
- Reduce bureaucracy, simplify processes and deliver additional flexibility in private-public interactions
- Prevent entrepreneurial brain drain and enhance entrepreneurial opportunity
- Design and institutionalise cross-sectoral technology foresight tools at the regional level
- Identify and promote local examples and good practices to stimulate entrepreneurial imitation
- Attract knowledge-based companies through incentives and create stable entrepreneurial environments

Source: Author

8.4 Conclusions

This chapter aimed at creating an understanding of what forms of organisational and regional capabilities are most appropriate to support the implementation of S3 in Crete and CM. To provide an analytical understanding, two main parts were developed and elaborated. The first part investigated what key capacities are currently available for Crete and CM to develop S3 productively. It

examined both micro-level and meso-level capacity building, with a particular focus on competences and skills relevant to innovation and regional development. In the second part, an empirical framework was built to identify capability enablers and explain how their effective exploitation is possible to facilitate the governance of S3 in Crete and CM. The findings show a notable difference of the way in which S3 development is affected by the existence of diverse forms of capabilities at the micro- and meso-level. For instance, we identify cases in which well-developed organisational competences favour the realisation of S3, and others in which the lack of strong capabilities does not allow the creation of an appropriate institutional environment to support the governance of S3 (institutional capacity). Starting the discussion from what capabilities exist and how they can impact S3 development in Crete and CM at present, four central types of capacity building have been examined systematically: technology and innovation (T&I) capabilities, networking capabilities, entrepreneurial capabilities and administrative and governance capabilities.

T&I capabilities are examined at the level of firms and revealed an extended variety, ranging from very low to very high performance. To understand this variation through the lens of S3, we created and studied three main groups of T&I performance: *zero-level capability firms (ZLC)*, *learners* and *technology-mature firms (TMF)* (see Table 8.3). We found that the ZLC firms are usually family-owned businesses with very weak T&I capabilities to take a key role in any of the S3 stages. As such, our analysis suggests that one must not expect from ZLC firms an active participation in the development of smart specialisation. In contrast, the learners have a relatively low T&I potential which, however, could be increased upon proper policy intervention in the context of S3. We showed that these companies are able to generate different types of innovations (e.g. process/product, organisational, technological), but their efforts are limited and not systemic. Since most of the Cretan and CM companies belong in this group, we highlighted the importance of conducting an analytical investigation of what policy initiatives should be launched to increase their T&I capacities and give an

implementation role in the context of S3. Last, we found a small number of firms which can demonstrate high T&I capacities. These are the TMF, which usually operate in high-tech manufacturing sectors with strong technological skills and well-built production competences. From the private sector, we saw the potential of TMF to lead the development of S3 action plans in Crete and CM.

Concerning networking, we examined capacity building at the level of firms and regions. We showed that the majority of local firms (ZLC and learners) have developed networking competences to support daily business operations instead of promoting innovation-related actions (as happening the case of TMF). We saw that firms' ability to build networking capabilities depends on their size and sector. Concerning size, the smaller the firm, the more difficult it will be to build inter-organisational networks for innovation activities. We have seen that micro-enterprises are less likely to participate in innovation or technology networks, comparing to medium-sized firms which can demonstrate a better networking performance. As regards to the type of sector, firms operating in knowledge-intensive industries (e.g. ZLC) show a higher collaborative tendency for S&T partnerships, while companies in more traditional industries (e.g. tourism) are more able to develop competences for entrepreneurial networking. Arguably, both types of networking are relevant for the implementation of S3. At the meso-level, inter-regional networking is usually built through the implementation of cross-regional programmes, as well as, through foreign entrepreneurial missions and trans-regional cooperation agreements. Our results on intra-regional networking highlight the limited ability for public-private networking (e.g. university-industry interaction) and the ineffective collaboration for policymaking in the public sector.

Entrepreneurial capacities were examined through three main types of entrepreneurship: *academic entrepreneurship*, *firm-level entrepreneurship* and *regional-level entrepreneurship*. As to the first, Cretan and CM academic centres have established both soft and hard infrastructures to support academic entrepreneurship. However, the required capacities to run effectively liaison offices, TTOs, technology

parks and other similar knowledge transfer initiatives remain weak. Regarding firm-level entrepreneurship, we found a large diversity in the ability of firms to build capacities for entrepreneurial searches and opportunities. Typically, organisational competencies are more relevant to address low-level entrepreneurship than knowledge-based entrepreneurship. At the macro-level, the capacity of Crete and CM for cross-border entrepreneurship is relatively good given the mechanisms which have been set by regional authorities to promote entrepreneurship abroad. The capacity for intra-regional entrepreneurship was found low in the sense that entrepreneurship has never been adapted in the policy agenda as a regional phenomenon which should be addressed constantly and systematically.

Last, as to the administrative and governance capabilities, we saw that while a number of Cretan and CM authorities have developed administrative skills to coordinate and run innovation-related actions, the meso-level governance capabilities remain at relatively low levels due to the low degree of regional autonomy, which suggests that Crete and CM are two regions with relatively low levels of policy autonomy and discretion.

In the second part of this chapter, we identified six types of capabilities and provided an analytical understanding as to how their development can support the implementation phase of S3 in the Cretan and Central Macedonian context. A summary is presented in Appendices Table 9. The process of mapping regional dynamics is a first capacity needed to favour the design and implementation of S3 in the selected regions. Three specific competences are required to develop this capacity efficiently: competences to assess the impact of previous innovation policy frameworks, to mobilise actual engagement of local institutional bodies and to evaluate local actors' performance on the basis of innovation and technology (public and private). A second is the capacity for decentralisation and regional autonomy which are needed to allow regional authorities to manage S3 practices locally, e.g. manage local funding regionally; reduce central bureaucratic and time-consuming processes for the provision

of tax incentives in selected S3 domains at the sub-national level to promote local entrepreneurship and attract foreign direct investments. The capacity to develop regional communication, networking and clustering is a third type of capacity building seen by respondents as important to facilitate S3 development in the case of Crete and CM. Four competences are suggested: competences to re-build trust among different entrepreneurial actors; ability to exploit the opportunities raised from the entrepreneurial discovery to enable regional clustering and networking; ability to exploit collective and powerful local networking to fulfil S3 policy-related objectives (e.g. additional authority and autonomy at the regional level); design and manage interactive communication platforms to facilitate inter-organisational networking, as a supplementary action in S3. As a fourth capacity we refer to all these skills required to link cross-sectoral activities including the ability to recognise industrial and sectoral diversity, the ability to identify related but disconnected business activities for potential networking, and the competency to link fragmented entrepreneurial activities, using several channel linkages. The capacity to understand and upgrade firms' technological and innovation potential is also important. We saw that this fifth process of capacity building requires the introduction of new regional indicators to assess and understand the particularities of firm-level innovativeness; competences to provide tailor-made training and targeted support and skills to assess organisational competences and knowledge skills for better policy intervention. Last, there is a need to build capabilities to enhance local entrepreneurship. The key competences should be developed for this process include: the building up and institutionalisation of permanent technology transfer and commercialisation mechanisms; re-think internal rules and ensure elimination of internal bureaucracy to speed up the creation of start-ups and spin-offs; policy initiatives to upgrade entrepreneurial skills training and rewards and support for the creation of financial tools (e.g. VCs) which are currently missing.

Chapter 9: Discussion and theoretical contribution

9.1 Introduction

This penultimate chapter brings together empirical findings from chapters 6, 7 and 8, with the objective of formulating and justifying certain contributions to knowledge. An analytical discussion aims to explain how the empirical findings from Crete and Central Macedonia (CM) connect to, and enhance, previous ideas, theories and concepts explored in the literature review and the conceptual framework chapters. The discussion is structured around the three key research questions (RQs), which have been formulated to drive the study and to meet its research objectives. A number of conclusions are discussed, allowing for claims of theoretical and practical contributions to knowledge.

9.2 Putting empirical results together - interpretation and discussion

RQ1 In what ways did the selected Greek regions develop smart specialisation strategies?

This first RQ aimed to understand how smart specialisation strategies were developed in the case study regions. Particular attention was given to analysing the methodological approaches which were used to design and implement S3 in both regional environments. Three main conclusions are drawn from the analysis regarding the implementation of smart specialisation in catch-up regions.

The first conclusion derived from RQ1 is that, even today, the development of S3 cannot be taken for granted in the regional setting, given that there are still a number of open implementation challenges which are particularly related to the governance and institutional capacity of catch-up regions. Our case shows that the

implementation challenge of S3 in Crete and CM refers to problems of critical mass accumulation; confusion and ambiguity of the role that local governance actors must take in the context of S3; state-centric bureaucracy and administrative burden in bottom-up innovation policymaking and action; and limited legislative power and autonomy of the regions to support place-based development. We saw that these barriers to S3 implementation are in their turn the result of the relationship between institutional design, modes of governance, and regional performance. In particular, the problem of the lack of thick institutions (e.g. regional-national state institutions lack public trust and increase state corruption challenges) and of good governance structures (e.g. absence of responsive regulatory systems to ensure transparency and accountability in public policy), raised policy uncertainty, increased local actors' inertia and led to important delays in conducting entrepreneurial searches and discoveries.

Interestingly, we saw that due to the lack of strong and interconnected industrial structures at the local level, as well as the inefficiency of the public sector to collectively respond to public policies to promote systemic innovation, Crete and CM encountered important difficulties not in designing but mainly in implementing S3 as a core territorial innovation strategy. In this respect, our findings support further the view that research on S3 must shift attention from theory (design) to practice (implementation) as recently suggested by Capello and Kroll (2016). It also evidences that no matter what policy studies advocate about the relevance of S3 to trigger regional renewal and promote convergence among European territories (EC 2013; OECD 2013; Gianelle and Kleibrink 2015), smart specialisation-driven convergence is unlikely to occur unless policy implementation barriers are effectively understood and addressed in European catch-up regions. While the idea behind this finding has been advocated by several studies since the onset of S3 (McCann 2015), our work shows that it is still an open and important issue which requires further empirical investigation of the role of governance and institutional capacity in S3 development, particularly for

catch-up regions where the innovation paradox is more profound (Oughton, Landabaso, and Morgan 2002).

A second key conclusion is that no one development pattern is ideally suited to the realisation of smart specialisation strategies in catch-up regions. We found that there is no best way to design S3 and, certainly, there is no optimal way to implement it. On the contrary, regardless of what several policy directions suggest regarding the implementation of S3 (EC 2012; EU 2016; Kempton et al. 2013), the case of Crete and CM shows that implementation decisions and practices can and must be different, to some extent, across regions with unlike specificities, capacities and dynamics, so as to be realistic, feasible and responsive to S3. To evidence empirically that S3 implementation approach is place-sensitive, we showed different patterns of smart specialisation behaviour between Crete and CM, (e.g. different ways of addressing and executing the entrepreneurial discovery, different routes to acquire critical mass) but by no means were we confident about showing notable differences in the success of S3 implementation outcomes. In this case, the selected regions illustrate an example in which two areas with a relatively similar innovation performance -they are moderate innovators (EC 2016), follow different methodological approaches to implementing S3 (e.g. narrow-to-broad vs. broad-to-narrow strategies), consistent with their ability to respond to challenges related, for example, to local actors' mobilisation and critical mass accumulation.

Previous research suggests that there is no optimal way to run entrepreneurial searches and implement smart specialisation strategies in a universally accepted way (Foray 2016; Foray 2014; McCann and Ortega-Argilés 2015) and, therefore, regions should find their own path to S3 implementation. Our findings enhance this view further by showing that in a Cretan and Central Macedonian context, the consideration of introducing tailor-made options to S3 implementation is not a policy suggestion nor a desired strategic option, but a necessary condition for a place-based implementation of S3. In this respect, the one-size-fits-all argument (Tödting and Trippel 2005) is directly

related to the smart specialisation process, and becomes increasingly relevant when implementation decisions are to be made.

The third conclusion is that smart specialisation development displays notable variations even across catch-up regions with very similar contextual conditions and closely related S3 priorities. We found that although Crete and CM are two regions which operate under the same national framework (they obey the same national and EU laws), possess innovation systems with many similar STI infrastructures (see chapter 5, Tables 5.3 and 5.6), represent a relatively similar innovation and R&D performance (see comparative figures for the last six years in chapter 5, Table 5.8) and, simultaneously, set similar entrepreneurial priorities (see chapter 6, Tables and 6.2 and 6.7), their approaches to S3 implementation were different.

The way in which regional disparities affect innovation policymaking and outcomes across different innovation performance territories has been broadly discussed in the economic geography literature (Asheim and Cooke 2011; OECD 2011a). In the context of S3, most of the available studies examine regional specificities and S3 practices either separately for each region (Luke et al. 2014; Morgan 2016; Gianelle et al. 2014; Valdaliso et al. 2014), and many of them focus on institutionally thick regions (Moodysson, Trippl, and Zukauskaitė 2015), or on different performance regions with concrete economic, geographical, cultural or historical differences. Concerning the latter, investigations and comparisons are usually made between leading and catch-up regions, industrial and rural regions, or among regions from different countries (Landabaso 2014; Kroll et al. 2014; Baier, Kroll, and Zenker 2013b; Reppel 2012). In our study we emphasise the importance of regional diversity in framing and progressing S3 across regions with very similar institutional contexts, by showing that even in these regions, path dependency keeps playing a determinant role in shaping the implementation decisions of S3. In this respect, through the case study regions, we evidence that S3 debate should no longer be about the importance of conducting different S3 practices across regions. Rather, it should be concerned with the question

of how regions can best identify their own implementation paths for S3 development through governance adjustments and institutional reforms.

RQ2 How do, and can, institutional arrangements and governance reforms impact smart specialisation practices?

Given that S3 implementation challenges are seen as the outcome of thin institutions and weak policy governance structures, the second RQ of the study aimed at investigating the role of governance and institutions on S3 development. Specifically, it was intended to examine what governance and institutional reforms are currently taking place in the regions of Crete and CM to support S3 implementation and further, to understand what new ways of policy governance are needed to assist the implementation of smart specialisation, and examine what institutional adjustments might be necessary to facilitate their deployment. In addition to a number of specific governance and institutional reforms discussed analytically in chapter 7, the analysis of RQ2 leads to four key conclusions.

Firstly, the cases of Crete and CM evidence that institutional change for S3 implementation in catch-up regions is most likely to happen through the modes of displacement and layering. In the literature review chapter, we saw that institutional change in economic development can take four different forms: displacement, layering, drift and conversion (Busetti 2015; Mahoney and Thelen 2009). The likelihood of displacement and layering, as two different but closely related modes of institutional change, in triggering new path creation and path renewal in the context of S3 has been discussed in previous empirical studies (Moodysson, Trippl, and Zukauskaitė 2015). That work, however, sought to understand institutional change and smart specialisation adaptation in institutionally thick and economically strong EU regions (the authors discuss the case of Scania, South Sweden). This study focuses investigation on the nature of institutional change and its potential to affect S3 development in less-advanced regions, with well-known institutional problems and challenges (Rodrik

2004a). In this respect, our work builds on existing empirical findings and contributes further by formulating the view that the development of regional smart specialisation strategies is most likely to be favoured through the displacement and layering of institutions.

In a Cretan and Central Macedonian context, the necessity to remove existing formal rules and introduce new institutions to favour S3 implementation (the process of displacement) is evidenced in chapter 7. In particular, section 7.3.3.4 analyses the idea of spatial re-organisation, in which a territorial restructuring through regional mergers can ensure the acquisition of critical mass. Crete and CM are two regions which face important difficulties in implementing smart specialisation due to their size, and the data show that it would be more effective if S3 has been developed in larger territories, beyond the NUTS2 level. As to the introduction of new institutions alongside existing rules (the process of layering), institutional change embodies the simplification of public-sector organisations and the increase in regions' legislative power to enforce place-specific development laws to respond to S3 development.

Secondly, smart specialisation implementation has acted as a policy trigger to jolt previous policy development inefficiencies and to improve regional innovation policy making. As a policy inefficiency, the study recognises the *design nationally execute regionally* approach, which was widely embedded in previous development frameworks, contradicting the emerging role of local entrepreneurial actors, e.g. public sector agencies, universities, intermediaries, and firms in regional development (Foray 2014; Asheim and Grillitsch 2015).

A number of regional development studies introduce smart specialisation as an innovation policy strategy which aims at bringing about change (Foray 2014; McCann and Ortega-Argilés 2014; Foray 2016). In current research, change is usually discussed in order to highlight the importance of structural reforms in S3 development (Asheim and Grillitsch 2015; Grillitsch 2015), its relevance to diversification and regional renewal (Boschma and Gianelle 2014; Balland et al. 2018), and its ultimate aim to boost

regions' economic development (OECD 2013). In our study, we found that in the framework of smart specialisation, change refers also to policy development improvements and happens in parallel with, and because of, the S3 practices; in this respect, change is studied in the context of place-based policy transformation.

Specifically, we showed that S3 have contributed to change the way in which regional development was understood and addressed in Crete and CM in four different ways. Firstly, by introducing the design of innovation strategies at the regional instead of the national level, we showed that this was the outcome of the *ex-ante* conditionality imposed by the EU to allow regions access to European funding and, in fact, it brought the central administration in Athens closer to the governments of Crete and CM for the purpose of designing regional innovation policies; secondly, by promoting a more closely European, national and regional co-operation in which multi-level communication is conducted regularly for the development of regional innovation policies; thirdly, by mobilising the involvement of local actors in a more intensive and collective way, data revealed a growing tendency in which local entrepreneurial actors and public administration authorities have shown more responsiveness in public-private collaboration; fourthly, by institutionalising and empowering existing and new institutional tools for intensified S3 implementation, for example, the case of the new Regional Scientific Council for Research and Innovation which took an institutional form in order to support S3 practices.

Our findings contribute to other related studies which tend to implicitly imply the importance of S3 dynamics in triggering change for regional development (Grillitsch 2015; McCann and Ortega-Argilés 2016a), yet they do not evidence this empirically. An exception is possibly the empirical work of Kroll (2015a), which discusses some novelty in regional strategies due to S3 practices.

Thirdly, the modernisation of S3 governance in catch-up regions is not only dependent on improving smart specialisation-related processes, but also on changing complementary governance practices, which may not relate to innovation

policymaking, yet they impact on its development. There is a growing recognition that the capacity of catch-up regions to build strong innovation governance models is critical for the design, and more importantly, for the implementation of S3 (McCann and Ortega-Argilés 2016a; OECD 2017b). In current S3 debates, the ability of regions to govern regional development is examined and analysed from different perspectives. For example, some studies examine policy governance from the Science, Technology and Innovation (STI) policymaking perspective (OECD 2013), aiming at understanding how participation, ownership and critical mass can be better ensured and regulated during S3 development (Landabaso, Georghiou, et al. 2014; Marinelli and Perianez-Forte 2017; Kyriakou et al. 2016). Other studies emphasise the move from the triple helix model (Etzkowitz and Leydesdorff 1995) to a quadruple helix approach (Carayannis and Campbell 2011), in which the process of understanding the elements of governing the relationships among government, industry, academia, and civil actors is the primary aim (Reek 2013; EC 2012; Carayannis and Rakhmatullin 2014). Undoubtedly, all these aspects to S3 governance are crucially relevant to smart specialisation theory, and increasingly important for its implementation in the regional setting.

However, in the case of Crete and CM, we showed that other, non-smart specialisation-related governance aspects have affected regions' capacity to govern S3 effectively. We used the example of recruitment to illustrate how old and new inefficiencies of public administration governance impact on regions' S3 policy governance options. Specifically, we saw that the recruitment of external smart specialisation experts was neither a possible nor a realistic option for Cretan strategists, not because of the fiscal consolidation (e.g. cutting wages and employment in the public sector), but due to public sector bureaucracy (time-consuming processes), internal inefficiencies, and to the new recruitment constraints imposed by

the TROIKA²⁷-external inefficiencies. The case of recruitment shows that Cretan and Central Macedonian options to S3 governance were to a large extent dominated by continuous exogenous control mechanisms. While these mechanisms were not linked to smart specialisation policy, they affected its implementation by raising its governance constraints. Arguably, though other recent empirical studies underline the influence of non-smart specialisation factors on S3 implementation, (see for example the work of Marques and Morgan (2018) and Morgan (2017)), our case study regions are not a typical EU situation, but rather a place-specific dimension of S3 policy governance, particularly emerging during the Greek economic crisis.

Fourthly, the implementation of smart specialisation strategies is not only a regional but also a national issue. In particular, we found that while weak regional institutions are indeed the main cause of the S3 implementation challenge (Kroll 2015b; Gianelle et al. 2016; Foray 2016), other national-specific routines, including political will, vested interests and administrative flexibility at the national level, also have an influential role in smart specialisation development. This view progresses further the idea of multi-scalar endeavour for the co-ordination of regional development (Todtling, Asheim, and Boschma 2013), in which different aspects of regional, national and supranational institutions should be examined for mutually beneficial ends (Morgan 2017). The importance of multi-scalar co-ordination is illustrated in our case by showing that the success of increasing regions' administrative autonomy to favour S3 practices is not only dependent on their effectiveness to induce and adopt institutional change (Grillitsch 2015), but also on the extent to which central governments are willing to desert *state knows best* routines and to support the process of this change. The cases of Crete and CM show also that it depends on the willingness of the central state to move autonomy and authority from the national to the regional

²⁷We recall that in the context of the European-Greek crisis, the Troika includes: the European Commission (EC), the European Central Bank (ECB) and the International Monetary Fund (IMF).
Note: The fiscal consolidation plan agreed with the Troika constrains new staffing in the public sector.

level, particularly in a period of keen financial crisis with high levels of instability, and uncertainty.

Without doubt, smart specialisation is a place-based regional innovation strategy and, as such, most attention regarding its implementation has been given to regions themselves and their ability to overcome several institutional governance barriers (Karo and Kattel 2015; Grillitsch 2015; Rodríguez-Pose 2013; Iacobucci 2014). Given that smart specialisation strategies focus on regional development (EC 2012; Landabaso and Foray 2014), an important part of the S3 debate investigates mostly the regional dimension, and neglects to study systematically how the national aspect impacts on S3 development in the regional setting. For example, many efforts are made to understand and improve the interplay among universities, regional authorities and entrepreneurial firms within the borders of a region (Fotakis et al. 2014; Gianelle et al. 2016; Landabaso and Foray 2014), while simultaneously, little is known as to how this local interplay is affected by diverse national elements beyond the regional context. Along the same line, other studies focus investigation on how to better build regional-level experimentation mechanisms for local learning (Moodysson, Trippl, and Zukauskaitė 2015), how to align policy actions to priorities (Kyriakou et al. 2016), how to set local monitoring and evaluation systems for the purpose of S3 (OECD 2013) or how to overcome connectivity problems among different kinds of regional actors (Aranguren et al. 2018), without examining in detail non-regional factors. In our study, we acknowledge the importance of studying regional dynamics for S3 development, but we also evidence the need for examining national and European factors that affect S3 implementation; for example, political will and support to promote transformation for the required administrative flexibility at the regional level.

RQ3 What capabilities exist and are required to develop smart specialisation strategies in catch-up regional environments?

The last RQ of this study aimed to identify what capabilities currently exist in Crete and CM, as well as what new ones are still required to improve institutions and favour the development of S3. Based on the findings presented in chapter 8, two key conclusions are extracted and discussed that are directly related to smart specialisation and capacity building.

Firstly, the governance and institutional reforms, examined in chapter 7, are less likely to succeed unless accompanied by the introduction and exploitation of well-developed capabilities at both the micro- and meso-level. Our case shows that there is a close relationship between micro-level and meso-level capacity building, and it underlines the importance of improving both. This finding highlights the aspect of complementarities in capacity building and promotes the idea of building synergetic effects between firm-level and regional-level capacities for S3 development in catch-up regions.

Furthermore, a number of studies show that economically weaker regions lack capabilities to address S3 practices and develop modern regional development policies (McCann and Ortega-Argilés 2016b; Foray 2016; Iacobucci 2014; Capello 2014). We showed that Crete and CM fit into this category, as they are two regions with little social capital, weak governance capacities, relatively low learning performance, significant challenges for institutional and structural change and, simultaneously, their S3 practices have been dominated by their weak institutional and governance capacities to implement public policy (see section 9.2 RQ1). However, we found that the capacity building challenge in Crete and CM was not simply due to the difficulty of less-advanced regions to enhance firms' capabilities, as currently advocated by several S3 studies (Foray 2014; Patricia and Tea 2017; Gianelle et al. 2016; Kyriakou et al. 2016), nor due to the obstacles of improving regions' administrative capacities (Grillitsch 2015; Aranguren et al. 2018; McCann and Ortega-Argilés 2016a; Asheim and

Grillitsch 2015). Rather, we evidenced that it was mostly due to the relatively weak ability of the regions to build and exploit a combination of both micro-level (firm-specific) and meso-level (regional) capacities, appropriate to develop an innovation-friendly environment for public policy implementation.

In the case of Crete and CM, the way in which firms' and regions' capacity building is linked to governmental and institutional integration for S3 development is captured in various ways. For example, while we revealed the need to make institutional changes to increase regional autonomy and gradually eliminate regions' dependency on national rulemaking (capacity building at the meso-level), Cretan and Central Macedonian public sector actors lacked the required legislative and administrative competences to create self-governing mechanisms for public policy implementation (capacity building at the micro-level). Similarly, while there was a great need for making policy governance adjustments to accumulate critical mass (meso-level), the ability of local firms to participate in S3 implementation (e.g. through R&D consortia) was limited due to their weak innovation and technological competences (micro-level). In this respect, our evidence goes beyond the views in which regional capabilities are treated as an important component for developing the self-discovery and prioritisation processes (Rodriguez-Pose and Wilkie 2015). Even more, our case shows that the success of S3 development depends on the extent to which a mixture of both micro- and meso-level capabilities can respond to institutional and governance changes.

Secondly, we view institutional capacity building as a dynamic process in which catch-up regions can increase their institutional thickness, by reflecting the principles embedded in the six capability types discussed in chapter 8 (capacity to map regional dynamics; capacity for decentralisation and regional autonomy; capacity to develop regional communication, networking and clustering; capacity to link cross-sectoral activities; capacity to understand and upgrade firms' technological and innovation potential; and capacity to enhance local entrepreneurship).

Given that institutional intervention cannot work through one-size-fits all approaches (Rodríguez-Pose 2013), the value of the six capacity building forms emerging from our analysis does not lie on a direct adoption and implementation, but rather on an analytical reflection which can show what might work well for other institutionally thin regional environments beyond Crete and CM.

We saw that institutional capacity or institutional thickness (Amin and Thrift 1995) is an emerging policy concept in the S3 literature (McCann and Ortega-Argilés 2016a), recognised as a highly relevant theoretical approach to understanding why policy implementation fails, particularly in less-developed EU regions (Grillitsch 2015; Kroll 2015a). However, it has been argued that *"there is little agreement about what improving institutional capacity really means and even less about what to do in order to weed out institutional inefficiency across what are widely varying geographical contexts"* (Rodríguez-Pose 2013, 1039). In this respect, it seems that there is no consensus as to what constitutes institutional capacity building. For example, Morgan (1997) argues that it is the improvements in place-based habits, conventions and routines that foster the institutional capacity of a territory. In a quite similar manner, Healey (1998) suggests that by increasing the level of trust and translatability among governance, citizens and companies, the institutional capacity of places is also likely to increase. Simply, this implies that the process of building institutional capacity can be examined from different perspectives, understood differently and addressed in diverse ways. The analysis of the study, however, shows empirically which capacity building forms are more likely to favour the process of institutional change and integration for S3 development in catch-up regions.

9.3 Contribution to knowledge

This thesis has provided an in-depth case study to examine and understand the development of smart specialisation innovation strategies in two catch-up European regions: Crete and Central Macedonia (CM). It makes two contributions to knowledge.

Firstly, it contributes to the conceptual foundation and design of regional innovation theory through the analytical lens of smart specialisation. Secondly, it contributes to the existing policy implementation literature by providing an empirical understanding of how S3 implementation challenge can be addressed in catch-up regions. Both aspects are discussed analytically in the following sections.

9.3.1 Contribution to regional innovation theory development

This thesis contributes to the conceptual foundation and design of regional innovation theory, and of smart specialisation theory in particular. It does so by evidencing that public policy thinking and development in catch-up regions need to be examined, understood and conceptualised through a systematic analysis of the interplay among governance, institutions and capabilities embedded in the wider environment of these regions. Especially, the thesis progresses regional development theory by showing empirically that the implementation challenge of smart specialisation goes beyond the claim that catch-up regions cannot develop S3 because of their limitation in building strong and receptive multi-level governance models (Kyriakou et al. 2016; OECD 2017a; Aranguren et al. 2018), the inability to change their thin institutions and make them responsive to regional development (Rodriguez-Pose and Wilkie 2015; McCann and Ortega-Argilés 2016a) or their enduring weaknesses in building exploitation capacities for innovation-driven growth and regional renewal (Iacobucci 2014; Landabaso 2014; Boschma and Gianelle 2014). On the contrary, the thesis uses empirical evidence to show that S3 implementation challenge is not simply due to obstacles and limitations in regions' governance, institutions and capacities, but mostly due to a number of interdependent barriers emerging from the interaction of these three critical regional development aspects, as well as from the effort to bring about change to improve each of them.

Furthermore, the thesis evidences that the S3 barriers go far beyond S&T, particularly in areas such as Crete and CM, which have to address other major

challenges due to prolonged socioeconomic uncertainty (e.g. need to tackle significant liquidity problems, high unemployment rates) and to TROIKA's exogenous intervention in public policy implementation (e.g. financial regulation and supervision). For instance, in contrast to other empirical studies, this study suggests that S3 challenge is not just about regions' inherent difficulties in setting up and exploiting industry-university partnerships for the purpose of S3 (Kempton et al. 2013); in engaging research universities in the entrepreneurial discovery (Edwards et al. 2017); in making large-scale R&D investments for S3 development (OECD 2013); or, more generally, in overcoming traditional barriers in science and innovation for smart specialisation implementation (Charles, Gross, and Bachtler 2012). And as such, simply focusing on strengthening regions' research and exploratory capacities, as partially suggested by a number of recent guides to S3 implementation (OECD 2013; EC 2012, 2014d), is absolutely relevant and useful, but it is by no means sufficient for catch-up regions to fully overcome the development barriers of smart specialisation. Rather, the thesis evidences that S3 implementation challenge in regions such as Crete and CM, is mostly due to a number of non-S&T barriers which are the result of a concurrent existence of ineffective governance models (e.g. lack of responsive public policy implementation regulatory mechanisms), thin institutions (e.g. limited regional power and institutional autonomy for self-governance in policy development) and regions' lacking transformative capacities to reverse this challenge (e.g. lack of transformative capacities to induce structural shifts and to introduce systemic change in smart specialisation-related practices).

This theoretical approach to S3 development barriers proposes that the smart specialisation debate should no longer be about regions' poor governance models or weak institutional capacities. Besides, the importance of improving governance and institutional capacity in smart specialisation development has been acknowledged in this study along with other empirical work; see for example Rodríguez-Pose and Di Cataldo (2015), Iacobucci and Guzzini (2016), McCann and Ortega-Argilés (2016a), and

Morgan (2017). Rather, it should be on how to best understand and address the opportunities and challenges emerging from the process of bringing together institutional integration, changes for responsive policy governance structures and capacity building improvements for the purpose of S3 development. This process is particularly challenging for Crete and CM which both experience important budget cuts and financial constraints for effective public policy implementation.

Especially, in a Cretan and Central Macedonian context, this is translated into a simultaneous examination of what non-smart specialisation-related institutional changes can be introduced (e.g. provision of additional regional autonomy for public policy implementation), what adjustments in governance models are critical (e.g. how to reduce bureaucracy in policy implementation processes) and what new capacities are still needed to support change for S3 development (how change can be supported by a combination of capabilities).

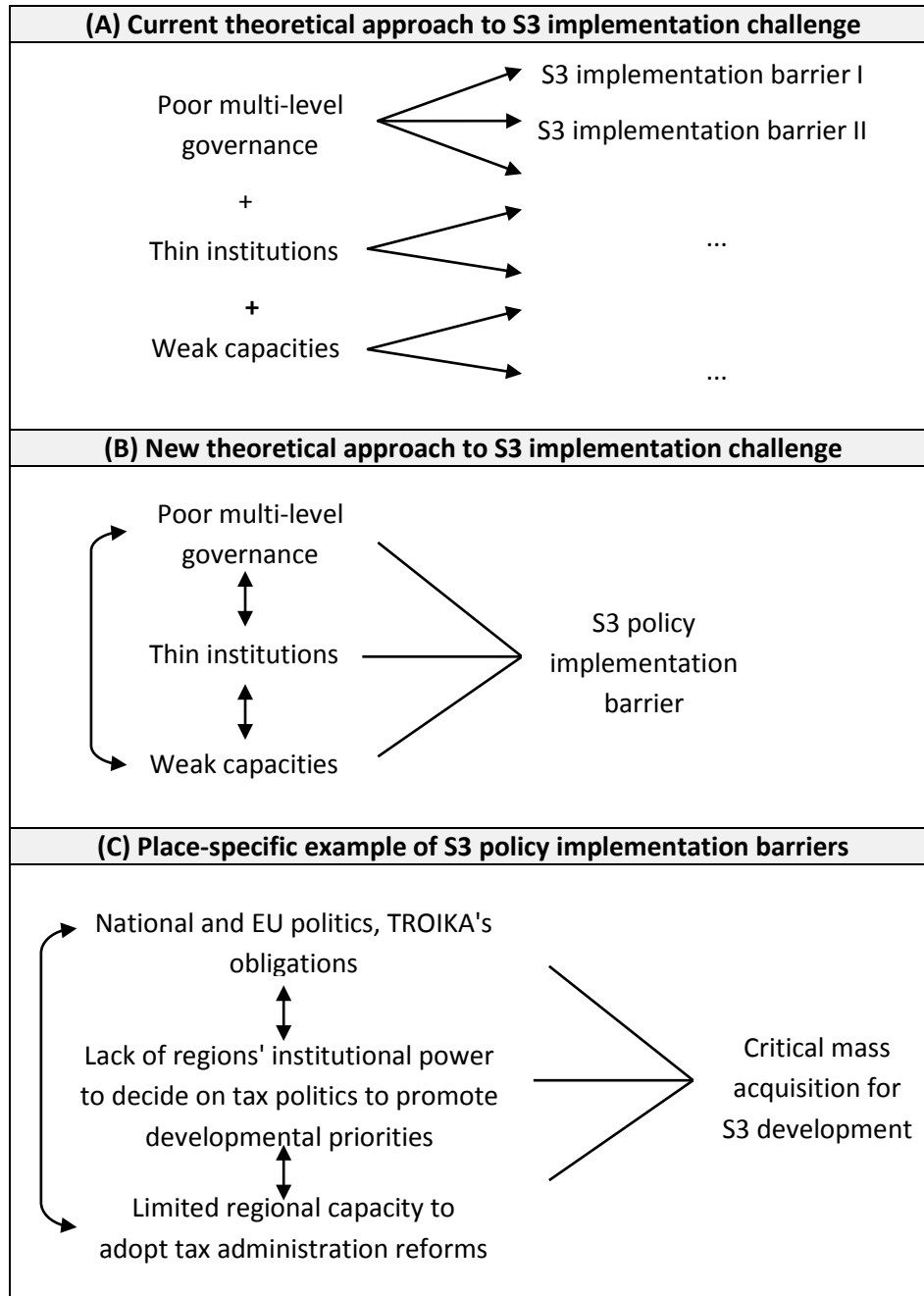
Furthermore, given that smart specialisation barriers may differ across regions with different development features (Marques and Morgan 2018; Sörvik et al. 2016), the thesis advances STI theory by showing that S3 implementation challenge can be addressed in a certain regional environment by tackling the challenge of bringing together and promoting governmental, institutional and capacity building progression. However, while such progression is seen as essential to smart specialisation development, we showed that its process remains complicated, with uncertain implications for public policy implementation (e.g. it is still unknown how institutional capacity building can lead to better policy governance modes). One main difference between our finding and the work of earlier theoretical and empirical studies about the importance of institutions, governance and capabilities on S3 development, see for example Rodriguez-Pose and Wilkie (2015), Gianelle et al. (2016), Kyriakou et al. (2016), Iacobucci and Guzzini (2016), McCann and Ortega-Argilés (2016a) and Foray (2016) is that this study evidences empirically that these three forces of regional development are closely related to and dependent on each other; and as such, they must not be

studied separately, as frequently addressed in the S3 literature at present, but concurrently and in close connection with each other in order to understand and address the multi-faceted challenge of S3 implementation.

Therefore, the study suggests that a simultaneous analytical examination of these inter-reliant policy development factors can contribute further to an understanding of the regional development gap discussed in the conceptual framework chapter: what governance and institutional change is required in catch-up regions for regional renewal and development (Kroll 2016; Radosevic et al. 2017), how such change impacts on economic growth (Rodríguez-Pose and Ketterer 2018), when this change must be initiated to be feasible and realistic (Morgan 2017) and what capabilities are needed to induce and support this change (McCann and Ortega-Argiles 2013a).

The way in which the thesis' theoretical approach to public policy implementation can improve further our understanding of how to best address S3 challenges in lagging regions is illustrated in Figure 9.1 diagrammatically. In particular, a place-specific example is used (see C), which evidences that S3 implementation challenges are not just about S&T and, even more importantly, that they are not emerging independently from separate problems in governance, institutions and capacities (see A), but from their combination (see B).

Figure 9.1 Theoretical approaches to S3 implementation challenge



Source: Author

Principally, Figure 9.1 shows that the problem of engaging and securing an adequate number of private firms in the development of S3 was due to three interrelated challenges concurrently emerging from inefficiencies in governance, institutions and

capacity building. Firstly, regions lack the required institutional power and autonomy to decide on tax politics (e.g. provide tax incentives at the sub-national level) to attract private investments in selected S3 domains and promote their smart specialisation developmental priorities (this is an inefficiency of institutions). Secondly, S3 options, decisions and practices related to regional taxation are to a large extent pre-scheduled and fixed by third parties; in fact, they are shaped by a number of national regulations, EU obligations and policy governance rules exogenously imposed by third parties, e.g. the TROIKA, particularly in regions such as Crete and CM which are currently under strict financial supervision (this is a multi-level governance inadequacy). Thirdly, the regional governments are not yet fully able to support tax reforms and promote large-scale investments for S3 development. They were not able in the sense that public administration authorities lack the required competences to respond to institutional change (this is a capacity building barrier), no matter if national and European authorities would have not been willing to promote decentralisation for regional self-governance in public policymaking.

Through this case study example, the thesis evidences a place-specific challenge to S3 implementation which is due to a combination of three inefficiencies that are closely interrelated to each other (see Table 9.1, C). As such, it suggests that its solution cannot be unilaterally found by simply looking at one single part (e.g. find a solution to overcome the institutional barriers), but rather by investigating the role and consequences of all related aspects derived from the interplay among governance, institutions and capacities. For example, in order to address the problem of critical mass acquisition, a process of concurrent consideration and change is important at the institutional, governance and capacity building levels. Particularly, an institutional reform is necessary, in which the provision of additional legislative autonomy and flexibility is necessary for the Cretan and Central Macedonian governments. This implies that part of central political power must be shifted from the national to the sub-national level, a process which, however, not only includes institutional change

reflection, but also imposes intensive political thinking and working as also suggested in previous empirical studies; see the work of Marques and Morgan (2018). In its turn, this process requires changes in multi-scalar governance co-ordination and political commitment at the EU, national and regional levels. In a very optimistic scenario (which is not evidenced in this thesis), the central government in Athens or even in the EU, may be willing to give additional legislative and policy governance autonomy at the sub-national level to assist regions to implement their S3 plans. In this case, institutional and governance barriers are theoretically overcome. The question, however, is to what extent are Cretan and Central Macedonian public administration agents ready to respond to these legislative changes? And, even more importantly, do they have the required administrative capacity to embody part of this central-state power in their operational routines and use it successfully in the context of S3? Obviously, this is a capacity building aspect which needs to be examined in parallel with the institutional and governance aspects. In any case, the thesis evidences that the selected regions are not yet fully capable of supporting high levels of decentralisation (e.g. the data show that they lack strong self-governance systems and administrative capacities to support policy implementation) and, therefore, it suggests a gradual decentralisation of power from the national to the sub-national level.

The Cretan and Central Macedonian case provides an example (Figure 9, C) in which smart specialisation development depends on particularities specific to each region and its broader environment, and it co-evolves with the investigation of what public policy governance aspects work well and what need to be changed, what institutional reforms are required to support change, and what micro-level (firm-specific) and meso-level (regional) capabilities exist or must be built to enhance this endeavour. This evidence contributes to recent knowledge gaps by improving further our empirical understanding of how smart specialisation policy can become more attuned to the heterogeneity not only of the regional conditions as suggested recently by Marques and Morgan (2018), but also of the national and EU conditions. Moreover, the way in

which smart specialisation development attunes to local specificities and is shaped by national and EU factors is evidenced in our case by showing that institutional change decisions for S3 governance improvements cannot be made without previously analysing whether and to what extent regions are able (e.g. to develop inherent capacities to govern and implement public policies) or allowed (e.g. due to exogenous pressures and limitations) to respond to this change adequately.

In particular, the example illustrated in Figure 9.1 shows that if our theoretical thinking does not reflect the examination of S3 implementation in parallel with institutional and capacity building aspects, then we certainly run the risk of conceptualising a regional development model in which innovation policymaking failure is a high possibility. In a Cretan and Central Macedonian context particularly, this S3 failure risk rests on the likelihood of introducing novel institutional changes for additional regional autonomy in regions which are not yet administratively mature enough to enforce them effectively. In our view, this is not simply an implementation challenge of regional innovation strategies at the policy level. Rather, it takes the form of a theoretical challenge in which there is neglect of an examination of our understanding of S3 implementation through an analytical study of the relationship among governance, institutions and capacity building within and beyond the regional borders. The way in which S3 development challenges can be better addressed at the policy level, constitutes the second contribution of this study and it is discussed analytically in the following section.

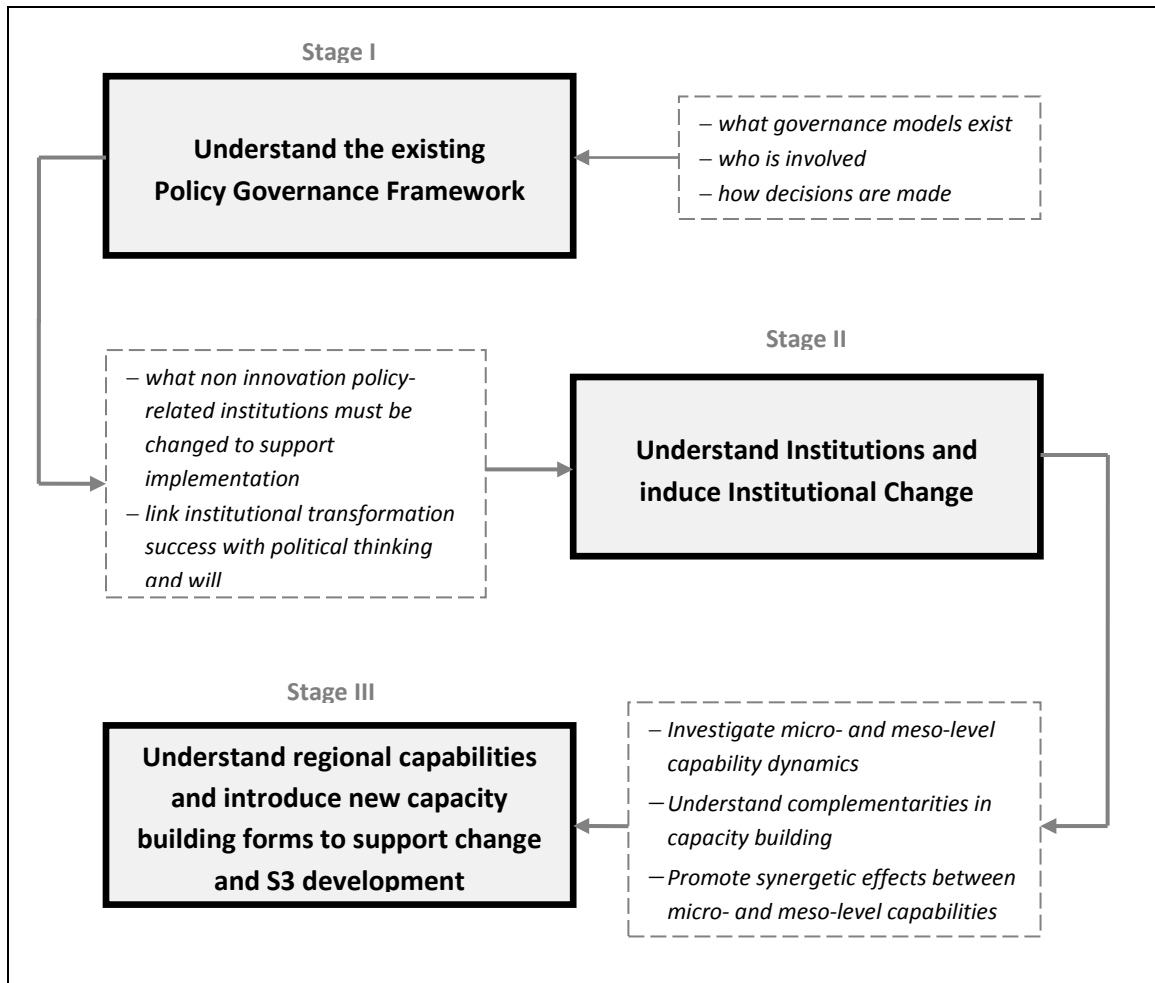
9.3.2 Contribution to policy implementation

From a policy thinking perspective, our work contributes to understanding how the S3 implementation challenge can be better perceived and addressed in practice. Given that there is no best way to put S3 theory into practice (Foray 2016), in the sense that similar methodological approaches may bring different S3 results across regions, we build an evidence-based policy model in which the process of developing S3 is

empirically captured and explained through an interplay of three core policy thinking aspects to regional development: governance, institutions and capabilities. In this model, a number of policy suggestions are generated to inform S3 policy thinking and practice in Crete and CM, and potentially, in other less-developed regions with weak governance and institutional environments (Farole, Rodríguez-Pose, and Storper 2011), and an arguably profound difficulty in implementing S3 (Rodríguez-Pose and Di Cataldo 2015; Grillitsch 2015). The value of this work rests on the fact that it provides S3 implementation guidelines in a period of growing criticism of the S3 adaptability in catch-up regions, due to their difficulties in building responsive institutions and adequate capacities for policy implementation (Andrews, Pritchett, and Woolcock 2017; Marques and Morgan 2018; Capello and Kroll 2016; Iacobucci and Guzzini 2016; McCann and Ortega-Argilés 2016a).

Our model builds a conceptual analysis of the ways by which S3 development can take place in catch-up regions, by suggesting that the process of understanding S3 implementation must be addressed through the examination of three different but closely related policy development stages (see Figure 9.2). This model rests on the premise that aspects emerging from governance, institutions and capabilities must be treated collectively and addressed as one coherent strategic effort. A number of recommendations for innovation policy strategists are made to support S3 implementation within and beyond the boundaries of the case study regions.

Figure 9.2 Smart specialisation development process: policy thinking and implementation factors



Source: Author

Furthermore, it proposes that firstly, one has to understand the framework in which regions govern and regulate innovation policy development. Understanding previous and current regional policy routines, learning practices and implementation patterns is increasingly important in the S3 context, given that path-dependency is seen as one of the fundamental features of economic development (Martin and Sunley 2006), on which smart specialisation builds and extends its principles for regional renewal and new path creation (Asheim and Grillitsch 2015; Valdaliso et al. 2014). This first stage involves an analytical investigation of what innovation policy governance models are

currently used and why, e.g. top-down vs. bottom-up; who is involved in this dynamic process, e.g. multi-scalar co-ordination among regional, national and supra-national actors (Marques and Morgan 2018); and how decisions are made and when, e.g. place-based vs. place-neutral approaches. Our case evidences the importance of this first stage, by highlighting that a number of practical implementation barriers were due to a limited understanding of how regional governance models were set to work in Crete and CM, e.g. policy uncertainty and local actors' inertia due to an unclear policy design and implementation framework. At a practical level, this first stage will help local strategists to develop a strategic approach to S3 development and create the base for building a more integrated policy implementation model, through a better understanding of the regional dynamics.

The second stage includes the consideration of institutions and institutional change in favouring innovation policy governance and implementation. In this stage we bring together the importance of institutions in regional development (Danny et al. 2009; Gertler 2010), their pivotal role in supporting regions in increasing their institutional thickness (Rodriguez-Pose and Wilkie 2015), and political thinking which is currently seen as a necessity for inducing regional institutional change for regional renewal and development (Marques and Morgan 2018). Moreover, our model examines institutional change and smart specialisation development on the premise of two critical aspects, which are highlighted and evidenced in our analysis.

First, based on the empirical observation that S3 development is not only dependent on institutions directly affecting innovation policy governance, (e.g. formal rules and regulations associated with innovation funding), our model considers the process of change in non-innovation policy-related institutions. Its aim is not to show universally how a series of generic institutional reforms (e.g. inducing most effective rules and laws to ensure property rights) are likely to favour economic growth (Rodrik 2004a; North 1989). Rather it seeks to show the way in which certain place-specific institutional adjustments must be examined and introduced to support innovation policy

governance and smart specialisation development. In the case of Crete and CM, this is evidenced by using the example of small-scale recruitment to show how TROIKA's formal regulations, well beyond the sphere of innovation policymaking, strangled S3 development in the case of Crete.

Secondly, reflecting on the way in which political processes shape the institutional environment (Marques and Morgan 2018), this model proposes that institutional change needs to go hand-in-hand with political thinking, not only at the sub-national level (e.g. regional government) but also, and perhaps most importantly, at the national and supra-national level (e.g. the EU). This implies that understanding both politics and timing is crucial for implementing S3 and, as such, it must be deeply embedded in policy design and implementation. Moreover, given that institutional transformation at the regional level usually implies shifts of political power from central to regional levels, our model suggests that the examination of institutional reforms for innovation policymaking must be accompanied by analytical reflections of political will and multi-scalar co-ordination among regional, national and EU authorities. The case of recruitment in Crete shows that if politics, beyond the boundaries of a region, are not seen as a core part of developing regional innovation strategies, the success of smart specialisation is not realistic, but rather utopian.

The third stage stresses the importance of micro-level (firm-specific) and meso-level (regional) capabilities in the processes of policy construction, and aims to understand what capacities exist, and are still required to support governance changes and institutional reforms for S3 development. The critical aspect in this stage is not to recognise the profound need for building more responsive capabilities for economic development (Andrews, Pritchett, and Woolcock 2017), but to examine which particular forms of capacity building and what specific dynamics embraced in these forms are most likely to build and enhance the institutional capacity of the regions. In our case, we saw that Cretan and Central Macedonian policymakers were capable of understanding the importance of introducing additional institutional flexibility for S3

development, but they were far from understanding how this process could be promoted through capacity building. We also evidenced the importance of complementarities in capacity building, by drawing attention to the synergetic effects between micro- and meso-level capabilities that S3 strategists must consider when moving from the design to the implementation phase. For example, we showed the significance of linking regions' capacity to design and retain interactive communication platforms for inter-organisational networking to the ability of firms to build a strong collaborative mentality to systematically interact with their networked environment.

In our empirical work, we identify six forms of micro-level and meso-level capacity building which are ideally suited to the Cretan and Central Macedonian environments in order to support institutional integration in the context of S3 (see Table 8.5). We suggested that the development of a mixture of these capabilities contains processes which can increase regions' institutional thickness, e.g. raise additional institutional autonomy and flexibility (Capacity II), recover public trust (Capacity III) and build, therefore, the required institutional capacity to respond to regional innovation strategies (Rodríguez-Pose 2013). While these six capacity building forms have been proposed in a Cretan and CM policy environment, we suggest that they can be also reflected in other similar regional contexts in which catch-up regions encounter similar problems to S3 implementation.

Chapter 10: Conclusions

10.1 Thesis overview

Inspired by the ongoing debate about how smart specialisation strategies (S3) can be best developed to increase European competitiveness, this thesis has investigated the implementation challenge of S3 in catch-up regions. Smart specialisation is a policy-prioritisation logic which builds on the existing regional innovation systems literature (McCann and Ortega-Argiles 2013b), and it has been introduced as the main EU regional innovation strategy to promote economic convergence across European territories (EC 2012). However, while smart specialisation's theoretical underpinnings have been well documented in the literature (McCann, van Oort, and Goddard 2016), S3 implementation cannot be taken for granted in the regional setting, given that we still lack understanding of how to overcome a number of practical barriers in less-favoured regions (Marques and Morgan 2018; Patricia and Tea 2017; Capello and Kroll 2016).

Recent empirical work suggests that these barriers are multi-dimensional and varied across different less-favoured European regions. For example, a number of studies link S3 implementation challenge to regions' weak governance systems (Gianelle et al. 2016; OECD 2017a). Typically, this work relates S3 implementation obstacles with the limited potential of catch-up regions to build strong and responsive multi-level governance structures for public policy implementation (Kyriakou et al. 2016; Radosevic et al. 2017; Sörvik et al. 2016). Others claim that smart specialisation development is affected by thin institutional environments that catch-up regions usually have (Rodríguez-Pose 2013; Asheim and Grillitsch 2015; Rodríguez-Pose and Ketterer 2018), as well as by weak transformative capacities of lagging regions to bring about change for regional renewal and development (McCann and Ortega-Argilés 2016a; Foray 2016; Capello and Kroll 2016; Boschma and Gianelle 2014).

This thesis aimed to understand the implementation challenge of S3, by focusing research on southern European catch-up regions with prolonged economic recession, weak institutions and profound difficulties in developing S3 (Landabaso, Komninos, et al. 2014). To this end, S3 implementation was investigated in two Greek catch-up regions (Crete and Central Macedonia-CM), which have been in fiscal crisis for over a decade. Its objective was to understand empirically the challenging process of putting S3 theory into practice, by examining the role of governance, institutions and capacity building in shaping regional innovation strategies and smart specialisation development.

Acknowledging the importance of investigating governance, institutions and capabilities on economic growth and on S3 development particularly, as suggested by the ongoing literature, the thesis uses related concepts and ideas from a combination of STI theories (catch-up theory, institutional theory, policy governance and capacity building theory) to build an analytical conceptual framework. This model conceptualises the view that S3 implementation barriers derive from a theory-policy gap in regional development studies, which goes beyond the narrow boundaries of smart specialisation theory. That is, we still lack empirical understanding of what institutional change is required in lagging regions for regional renewal and development (Kroll 2016; Radosevic et al. 2017), how change impacts on economic growth (Rodríguez-Pose and Ketterer 2018), when change must be initiated to be feasible and realistic (Morgan 2017) and what forms of capacity building are needed to induce and support this change (McCann and Ortega-Argiles 2013a). The study aimed to address this gap and it makes both theoretical and practical contributions to regional policy implementation by investigating when, how and what policy intervention and change can bring improvements in governance, institutions and capabilities to support S3 development in catch-up regions. To do so, both general and specific research objectives were formulated.

General and specific research objectives

The general research objective of this thesis is to study the implementation challenge of S3 in catch-up regions, which have been at the top of the EU cohesion policy agenda (EC 2014c). Research focus is primarily given to Southern European catch-up regions, given their prolonged economic recession, weak institutions and profound difficulties in implementing S3 (Landabaso, Komninos, et al. 2014).

Its specific research objective is to investigate and understand empirically how governance, institutions and capacity building can impact on S3 practices and support smart specialisation development in two Greek regions (Crete and Central Macedonia), which have been in fiscal crisis for almost eleven consecutive years.

Research Questions

(RQ1): In what ways did the selected Greek regions develop smart specialisation strategies?

(RQ2): How do, and can, institutional arrangements and governance reforms impact smart specialisation practices?

(RQ3): What capabilities exist and are required to develop smart specialisation strategies in catch-up regional environments?

To operate the conceptual framework and test its theoretical underpinnings in a Cretan and Central Macedonian context, a specific research design based on a qualitative case study approach was developed. Three research questions were formulated, using both inductive and abductive research strategies to explore the research objectives systematically. To gather the data, fifty semi-structured interviews were carried out in both case study regions during 2014-17 (including longitudinal research in the region of Crete). To provide additional validity to the study, participant observation was also used as a main source of data collection, through participation in

S3 workshops including entrepreneurial discovery and open consultation events. Given that the in-depth interviewing generated an enormous amount of textual information, NVivo (Ver.7) was used to organise and analyse the data effectively. The majority of the interviews were transcribed and then translated from Greek to English.

10.2 Key findings, conclusions and contribution to knowledge

Key findings

In chapter 6 (RQ1), we examined the development options of S3 in the case study regions. We found that Crete and CM encountered notable difficulties in adopting smart specialisation as a core territorial innovation strategy. The implementation challenge of S3 in Crete and CM rests on place-specific problems derived from governmental and institutional inefficiencies, within and beyond the boundaries of the regions, leading to critical mass accumulation, public-sector administrative burden and limited power of the regions to legislate for regional development. In their turn, these problems raised policy uncertainty, increased local actors' inertia and led to delays in conducting entrepreneurial searches and discoveries. To address this policy implementation challenge, the local governments of Crete and CM followed different methodological approaches, based on a slightly different understanding and conceptualisation of the smart specialisation rationale. Particularly, in the case of Crete, a narrow-to-broad approach was adopted for entrepreneurial searches and priorities, in which a small group of S3 experts was allocated unofficially by the regional government to commence the process of discovery, followed by public consultations to guide the prioritisation and selection processes. In the case of CM a broad-to-narrow approach was selected, accompanied by widely open and transparent practices. In this option, the entrepreneurial discovery was initiated through the joint work of a large number of private and public sector actors. Progression was achieved via the work of thematic working groups and the final selection of the S3 priorities was

justified and approved by a large number of actors through a series of consultations conducted in the region.

In addition, we saw that different policy tools were created and used by local policymakers and strategists to assist S3 development. In the case of Crete, attention was given to the introduction of certain complementary instruments, including the regional innovation council and the Crete Innovation Initiative (CRINI), while in CM the creation of an S3 one-stop-shop was seen as first priority.

To move research forward and to meet the second research objective of this study (RQ2), chapter 7 investigated the role of governance and institutions on S3 development. We started our analysis by evidencing the weakness of both regions to govern regional development strategies in previous innovation policy frameworks. We linked this policy implementation inefficiency to *design nationally, execute regionally* governance models, in which there was a lack of direct engagement of local entrepreneurial actors for leading the design of innovation policymaking at the regional level. However, we saw that this policy governance practice is currently changing along with the development of the new S3 framework. In particular, we evidenced a new perception to innovation policy thinking, in which the process of designing regional innovation strategies was shifted from central to regional governments. This new policy approach ranked the design of innovation strategies as a high regional priority and raised new opportunities for place-based policy development as extensively suggested by the literature (Barca 2009b). Nevertheless, despite progress in regional policy thinking, we saw that the challenge of governing innovation-driven growth was still an important open issue, predominantly for the implementation stage, in which both Crete and CM encountered a number of implementation challenges as discussed above.

As a solution to this policy implementation problem, the study evidences three key governance reforms to be made in advance, or at least during the development of smart specialisation.

The first is to change autonomy levels in regional policy governance and allow for more administrative flexibility in public-sector agencies' procedures. We showed that public-sector agencies were capable of governing the design of S3, but less administratively independent to implement it. Therefore, regardless of whether Brussels or Athens may or may not be willing to give Greek regions more administrative autonomy, fearing corruption at the sub-national level, the data of this study show that increasing regional autonomy is an emerging issue to be thoughtfully considered in the new policy implementation agenda of smart specialisation.

As a second reform, the study evidenced the simplification of smart specialisation-related processes. Three Cretan and Central Macedonian examples were used (the state aid information system; national conditionality limitations; and weaknesses from European and national mechanisms) to show how the process of governance simplification can lead to better S3 practices and outcomes.

The third proposed change is related to the way in which local firms' critical mass was accumulated and governed. Given the significance of entrepreneurial firms in the discovery process on the one hand, and their low participation in the Cretan and Central Macedonian practices on the other, the analysis suggests the undertaking of more intensive policy initiatives, complementary and supportive to S3 governance (e.g. target groups of firms instead of single firms), in which a large number of groups of firms can be ensured in S3 implementation.

As to the institutions and the institutional changes to support policy governance options and S3 development, our evidence from Crete and CM showed a series of reforms, changes, and adjustments to be conducted in at least four different directions. Firstly, the thesis evidenced the importance of the public administration sector in introducing organisational changes to tackle public sector uncertainty and rebuild public trust.

The second reform suggests a thorough consideration of the existing institutions in order to examine changes in regions' legislative power, with the objective of allowing

Crete and CM to develop and enforce their own development laws. We saw that a new regionally-based legislative framework, in which regions can support place-based options and decisions (e.g. provide tax benefits to accumulate critical mass), can support the creation of a more institutionally-friendly environment for S3 development. The study showed empirically that this change is of high priority and requires different scales of governmental co-ordination and action within and beyond regions.

The third reform is related to the implementation and enforcement of the institutions. We found that institutions in Crete and CM are not effectively-enforced (e.g. public services are not delivered in time), and this weakness leads to specific public policy implementation problems (e.g. public-private sector inertia) due to the lack of a stable, fair and trust-worthy environment for S3 action.

Finally, an ambitious institutional reform is proposed for the purpose of public policy development, and particularly of smart specialisation implementation. This reform promotes the idea of spatial re-organisation (e.g. territorial restructuring through regional mergers) to accumulate and ensure the required critical mass from both the public and private sector.

Lastly, in chapter 8 (RQ3) we provided an analytical understanding of what forms of organisational (micro-level) and regional (meso-level) capabilities are most appropriate to support the implementation of S3 in Crete and CM. As to the existing capabilities, the findings show cases in which well-developed organisational competences favoured the implementation of S3, and others in which the lack of strong capabilities prevented the creation of an appropriate institutional environment to support the governance of S3. Four central types of capacity building with a direct relation to regional innovation have been examined systematically: technology and innovation (T&I) capabilities, networking capabilities, entrepreneurial capabilities and administrative and governance capabilities.

The study of T&I capabilities was conducted at the level of firms. Three main groups were created and examined: *zero-level capability firms (ZLC)*, *learners* and *technology-mature firms (TMF)*. The study shows that the ZLC firms are usually family-owned businesses with very weak T&I capabilities and low potential for S3 action. The learners usually have low T&I capacity, but a relatively high potential for S3 action given that they can learn to innovate following proper policy intervention. The TMF demonstrate high T&I capacities and potential to lead S3 practices.

Concerning networking, capacity building was examined at the level of firms and regions. At the micro-level, we found that ZLC and learners have developed networking competences to support daily business operations, and TMF to promote innovation-related actions. The cases of Crete and CM reveal that the smaller the firm, the more difficult it will be to build inter-organisational networks for innovation activities due to limited resources. It also shows that micro-enterprises (usually learners) are less likely to participate in innovation or technology networks, compared to medium-sized firms (TMF), which can demonstrate a better networking performance. At the meso-level, inter-regional networking is built through cross-regional programmes, foreign entrepreneurial missions and trans-regional cooperation agreements. The results on intra-regional networking highlight the limited potential for public-private networking and ineffective collaboration for policymaking in the public sector.

Entrepreneurial capacities were studied through the lenses of academic entrepreneurship, firm-level entrepreneurship and regional-level entrepreneurship. As to the first, while there are a number of TT mechanisms (e.g. liaison offices, TTOs, technology parks), academic entrepreneurship in Crete and CM remains at relatively low levels, due to the weaknesses of academia to exploit them effectively. Concerning firm-level entrepreneurship, we saw that firms' organisational competencies are more relevant to address low-level than knowledge-based entrepreneurship (except learners and TMF which operate in knowledge-intensive industries). At the meso-level, the capacity of Crete and CM to promote cross-border entrepreneurship is relatively good

given the mechanisms which have been built by regional authorities to promote entrepreneurship abroad. The capacity for local entrepreneurship was found to be low in the sense that entrepreneurship was not part of the regional policy agenda.

Lastly, as to the administrative and governance capabilities, the study evidences that while a number of Cretan and Central Macedonian authorities have developed sufficient administrative skills to co-ordinate and run innovation-related actions, regions' capabilities remain at relatively low levels due to the low degree of regional autonomy for bringing about change in governance and institutions.

In respect to new capacity building, the thesis identified six types of capabilities and explained how their development can support S3 implementation in Crete and CM. The process of mapping regional dynamics is a first collective capacity appropriate to allow regions to understand in detail the framework in which innovation actions takes place. Three competences are required to build this first capability for S3 development: competences to assess the impact of previous innovation policy frameworks, to mobilise actual engagement of local bodies and to evaluate local actors' T&I performance. A second is the capacity for regional decentralisation, aimed at allowing for more place-based options in regional development. We saw that the creation of regionally-based negotiation competencies is seen as essential for this type of capability. The capacity to develop regional communication, networking and clustering is evidenced as a third type of capability to facilitate strategic collaborative synergies for S3 development. As a fourth capacity we refer to all those skills required to link cross-sectoral activities including the ability to recognise industrial and sectoral diversity, the ability to identify related but disconnected business activities for potential networking, and the ability to link fragmented entrepreneurial activities. The capacity to understand and upgrade firms' technological and innovation potential along with the need to build capabilities to enhance local entrepreneurship are also two important capabilities that must be developed to support S3 implementation.

Key conclusions from the discussion

We started our discussion by pointing out that the design, and particularly the implementation of S3, is still an open issue for European regions. This is evidenced in the case studies by revealing a number of implementation barriers which are due to weaknesses derived from the interplay among governance, institutions and capabilities in catch-up regions. In this respect, the thesis supports further the view that S3 debate must shift attention from theory to practice (Capello and Kroll, 2016), with the objective of understanding how lagging regions can move from smart specialisation policy design to S3 implementation. The analysis of Crete and CM shows empirically that while S3 is currently seen as the core EU territorial strategy for regional renewal and European convergence (EC 2013; OECD 2013; Gianelle and Kleibrink 2015), smart specialisation-driven convergence is unlikely to occur unless policy implementation barriers are effectively understood and addressed in European catch-up regions.

However, this process is by no means easy, nor are the ways in which it takes place. The thesis shows that this is due to a place-sensitive and still unknown approach to S3 implementation, in the sense that there is no one implementation pattern ideally suited to S3 development in catch-up regions. This view rests on the principles of the one-size-fits-all argument (Tödtling and Trippel 2005), and it further progresses previous empirical and theoretical claims which suggest that there is no best or common way to address the implementation of S3 (Foray 2016; Foray 2014; McCann and Ortega-Argilés 2015). It does so by evidencing that the consideration of introducing place-specific development options for S3 implementation must not be seen as a policy suggestion or a desired option anymore (OECD 2013), but as a necessary condition for a successful place-based implementation of S3 across EU regions.

In addition, we saw that the consideration and selection of place-specific options for smart specialisation development is not only critical for catch-up regions with apparent differences in their structures, but is also important even for areas with alike contextual conditions and closely related S3 priorities. This is evidenced in the case

studies by examining S3 implementation options between regions that obey the same national and EU laws, possess innovation systems with many similar STI infrastructures, represent a relatively similar innovation and R&D performance, and identify similar S3 priorities, yet they address S3 practices differently (e.g. narrow-to-broad vs. broad-to-narrow entrepreneurial searches). This raises, in the context of S3, the increasing role of regional diversity in shaping economic development (Asheim and Cooke 2011; OECD 2011a), and evidences the importance of regional disparities in framing and determining S3 practices even across regions with very similar institutional contexts.

The need to understand empirically how smart specialisation can be best realised in less-favoured environments, led this study to a more analytical investigation of the governance and institutional dynamics of Crete and CM. Focus was primarily on understanding what regional governance and institutional adjustments are currently taking place to support innovation policy action, as well as what new ways of policy governance and institutional reforms are still required to support the development of S3. The empirical analysis points to potential governance and institutional adjustments. These changes, discussed analytically in the previous section of this chapter, have been envisaged to fit the specificities of Crete and CM and, as such, they refer particularly to a Cretan and Central Macedonian context. However, during investigation, a number of other empirical findings, beyond the interest of the case study regions, emerged, contributing to a theoretical and practical understanding of S3 adaptability in the regional setting.

Firstly, acknowledging the four modes of institutional change discussed in the literature review chapter, meaning displacement, layering, drift and conversion (Busetti 2015; Mahoney and Thelen 2009), the thesis evidences that S3 implementation in catch-up regions is most likely to happen through displacement and layering. Given that previous research sought to understand the relation between modes of institutional change and smart specialisation adaptation in institutionally thick EU regions (Moodysson, Trippl, and Zukauskaitė 2015), our work builds on existing

empirical findings and contributes further by evidencing that the development of S3 in less-advanced regions is most likely to be favoured through the displacement and layering of institutions. In a Cretan and Central Macedonian context, the necessity to replace existing formal rules with new institutions to favour S3 implementation, the process of displacement, is evidenced through the idea of spatial re-organisation, in which a territorial restructuring through regional mergers can ensure the acquisition of critical mass. As to the introduction of new institutions alongside existing rules, the process of layering, institutional change embodies the simplification of public-sector organisations and the power of regional governments to enact tailor-made development laws, such as granting fiscal incentives, to support S3 development.

Secondly, we saw that smart specialisation has acted as a trigger of policy implementation change by inciting regions to overcome previous policy development inefficiencies. In the case of Crete and CM, S3 helped regions to overcome the design nationally-execute regionally ineffective approach. Given that S3 is currently seen as an innovation strategy that aims to bring about change (Foray 2014; McCann and Ortega-Argilés 2014; Foray 2016), we show that smart specialisation-driven change is not only related to structural reforms (Asheim and Grillitsch 2015; Grillitsch 2015), institutional adjustments (Rodríguez-Pose and Di Cataldo 2015), or diversification and regional renewal (Boschma and Gianelle 2014; Balland et al. 2018), it also relates to policy development improvements which happen in parallel with, and because of the S3 practices. This view is evidenced empirically in this study by showing that smart specialisation acted as an important driving force in encouraging Crete and CM to start designing public policies at the regional instead of the national level. It also supported regions to promote a close European, national and regional co-operation, to mobilise the involvement of local actors in a more intensive and collective way, and to empower existing and new tools for S3 implementation including structures such as the new Regional Innovation Council and a one-stop-shop for public policy implementation.

Thirdly, while weak regional institutions and governance regimes are seen as the main cause of the S3 implementation challenge (Kroll 2015b; Gianelle et al. 2016; Foray 2016), we showed that other non-regional factors and usually beyond S&T, including political will, national vested interests and governance constraints imposed exogenously (e.g. by the TROIKA or the EC), also hinder S3 development. Our case evidenced a non-typical EU situation, in which the success of S3 development is not only dependent on the effectiveness of catch-up regions to change their institutions (Grillitsch 2015; Rodriguez-Pose and Wilkie 2015) or improve their governance structures (Kyriakou et al. 2016; Radosevic et al. 2017), but also on the extent to which non-regional political level factors impact on S3 practices (Marques and Morgan 2018), e.g. the reluctance of central administration to shift power from national to regional levels and TROIKA's constraints in public-sector recruitment. This view progresses further the idea of multi-scalar endeavour for the co-ordination of regional development (Todtling, Asheim, and Boschma 2013), in which different aspects of regional, national and supranational institutions should be examined for mutually beneficial ends at the regional level (Morgan 2017).

Fourthly, we saw that the success of promoting governance and institutional integration on the one hand, and the ability to address non-regional challenges to S3 development on the other, are less likely to succeed if not accompanied by the introduction and exploitation of well-developed capabilities at both the organisational and regional level. Inspired by previous empirical studies which suggest that economically weaker regions are more frequently found to lack capabilities to address S3 practices (McCann and Ortega-Argilés 2016b; Foray 2016; Iacobucci 2014; Capello 2014), we draw attention to the aspect of complementarities in capacity building and to the importance of building both regions' and firms' level capacities for S3 development in catch-up regions. Given that there is no consensus as to what constitutes institutional capacity building (Rodríguez-Pose 2013), we proposed a mixture of six micro- and meso-level capabilities, which may not be connected directly

to research or S&T related aspects, as broadly suggested by a number of S3 studies (OECD 2013; EC 2012, 2014d), yet they are seen to have an important impact on S3 development. These capabilities are specific to lagging regions and, apart from supporting them to increase their institutional thickness (Kroll 2015a; Grillitsch 2015), they can also assist regions to overcome S3 implementation barriers derived from exogenously imposed S3 challenges.

Theoretical and practical contribution to knowledge

Contribution to regional development theory

This thesis contributes to the conceptual foundation of regional development theory by improving smart specialisation implementation theory. In particular, the study progresses regional development, by showing empirically that smart specialisation implementation challenge needs to be examined and understood through a concurrent and systematic analysis of the way in which governance, institutions and capabilities embedded in the wider environment of a region are related and have evolved. It suggests that S3 debate should no longer be about how to improve exploratory capacities in catch-up regions, as currently suggested by a number of S3 implementation guides, (see for example (EC 2012; Reek 2013; EU 2016; OECD 2013). Rather, more emphasis could be put on simultaneous and systematic theoretical understanding of the interrelation of these three components of regional development (governance modes, institutions and forms of capabilities) and that will show what implementation practices are realistic, feasible and responsive to S3 development. Realistic in the sense that not only regions' resources and capacities, but also other multi-scalar factors of public policy governance and development can be ensured and co-ordinated to build responsive mechanisms for S3 implementation (e.g. political will, commitment and support at national and EU level); feasible in the sense that the required adjustments, changes and reforms can bring the desired results within the

scheduled timeline; and responsive in the sense that S3 practices fit to specific needs and development features of the regions.

Our theoretical contribution is built on the empirical findings from Crete and CM which progress the existing research about S3 by evidencing that governance, institutions and capacity building are closely related to and depend on each other and, therefore, they must not be examined separately as is usual in the literature (Rodriguez-Pose and Wilkie 2015; Capello and Kroll 2016; McCann and Ortega-Argilés 2016a) but concurrently, collectively and in great detail. We showed that, in the context of S3, public policy implementation is a dynamic process in which governance improvements and institutional integration co-evolve with the potential of regions to build policy implementation capacities. And as such, a theoretical investigation of how current and prospective aspects of governance, institutions and capabilities are related to each other is essential in order to bring more responsive policy results. For example, we saw that while institutional reforms such as the provision of additional governmental flexibility at the sub-national level to allow regions make small governance decisions (e.g. recruit an S3 expert), are critical for regions to change existing governance regimes and to favour place-based policy implementation, Crete and CM lacked the required administrative capacity to induce and support these reforms effectively.

In this respect, we strongly agree with the vast majority of the latest empirical suggestions that the examination of governance, institutions and capacity building are increasingly critical for the design and implementation of S3 (Foray 2016; Morgan 2017; Iacobucci and Guzzini 2016; Gianelle et al. 2016; McCann and Ortega-Argilés 2016a; Radosevic et al. 2017), but we partly agree with the tendency to study them separately, as an in-depth investigation to study their impact on S3 development as a joint and collective endeavour is neglected. In this thesis we conceptualise the view that the implementation challenge of S3 in catch-up regions should no longer be about their poor multi-level governance systems (OECD 2017a; Marques and Morgan 2018), or their weak institutional capacity to respond to innovation-driven growth (Grillitsch

2015; Rodriguez-Pose and Wilkie 2015; Kroll 2015a; McCann and Ortega-Argilés 2015), but rather on understanding the interplay between policy governance, institutional integration and capacity building. In fact, there are a large number of studies which broadly suggest that S3 require good institutions and strong policy capacities (Foray and Goenaga 2013), but most of these studies do not show empirically what particular changes or improvements are ideally needed to meet this objective systematically. On the contrary, this study evidences that a simultaneous and analytical investigation of governmental, institutional and capacity building aspects can contribute further to an understanding of what place-specific governance and institutional change is required in catch-up regions, how such change can affect policy development and when, and what organisational and regional capacities, beyond S&T, are required to support this change.

Contribution to policy implementation

As to policy implementation, this thesis contributes to the further advancement of regional policy studies, by providing a practical understanding of how S3 implementation challenge can be better perceived and addressed in practice. Acknowledging the role of regional diversity in S3 development (Bachtler et al. 2017), and the complexity to follow similar policy implementation routes across different regional environments (Foray 2016; Aranguren et al. 2018), the thesis proposes a three-stage policy implementation model (see Figure 9.2), that innovation strategists can use to search for an S3 implementation mix that best corresponds to their own needs. An understanding of how governance, institutional and capacity building aspects are related to each other to support public policy implementation is primary highlighted in this model. In particular, the model is not for showing how change and improvements can play a key role in developing S3 when governance, institutions or capabilities are examined and improved, but that S3 implementation challenge can be better addressed when these three aspects are examined together in a certain

territorial context. Three main stages are evidenced and proposed in this model through the case studies.

Firstly, one has to analyse and understand the framework in which regions govern and regulate innovation policy development. This is an important stage, given that the structure and operation of policy governance frameworks may not be always clear and understandable in less-favoured regions (OECD 2017a). For example, does the region run, at present, a model which routinely favours place-based options and practices (Barca 2009b), enables the interaction of local entrepreneurs (Foray 2014), or promotes multi-level co-ordination for public policymaking (Kyriakou et al. 2016)? Or is it a top-down model in which decisions about regional development are made centrally at a national and European level? In the case of Crete and CM, we saw that public policy governance and particularly smart specialisation regulations are to a large extent shaped exogenously by third parties due to the financial crisis (e.g. the TROIKA, EU). Hence, this first stage involves an analytical investigation of what innovation policy governance models are currently used and why, who is involved in this dynamic process and how key decisions are made.

The second stage includes the consideration of institutions and institutional change in favouring innovation policy governance and implementation. Building upon empirical evidence from Crete and CM, this stage underlines the importance of examining institutions which are not only related in a straight line to public policy governance (e.g. institutional tools for policy implementation), as broadly suggested by the S3 literature (Rodriguez-Pose and Wilkie 2015; Grillitsch 2015; Sörvik et al. 2016), but also to norms and regulations, either formal or informal, that may not be directly related to public policy governance, yet they impact S3 implementation (e.g. institutional barriers for fast-track requirement).

The third stage recognises the emerging role of capacity building as a means of understanding what capacities exist, and are still required, to support governance changes and institutional reforms for S3 development. The model centres the

importance of complementarities in capacity building, by stressing the synergetic effects on S3 development between micro-level (firm-specific) and meso-level (regional) capabilities.

10.3 Limitations of the study

A number of limitations regarding our methods must be considered and discussed. First, given that we use a case study approach, a potential limitation of our methodology is the selection and analysis of only two regions, which may imply that our empirical findings and conclusions are not necessarily transferable to other regional contexts (Yin 2009). In our analysis, we use Crete and CM as an example of catch-up European regions to study smart specialisation development. These regions, however, are by no means identical to other European environments and, therefore, assumptions which neglect or go beyond the consideration of regional specificities run the risk of not being robust. To address this methodological challenge and broaden our findings into a wider STI discussion, theories and concepts which advocate the risk of transferring and applying development strategies from one place to another, e.g. the one-size-fits-all approach (Tödtling and Trippl 2005), were examined and considered systematically.

Secondly, given that smart specialisation policy development is currently on board in our case regions, there is an objective difficulty in recognising and studying all possible elements and factors that may be related to S3 implementation. In this respect, there is a potential challenge from accidentally neglecting the examination of place-specific evidence which has not yet emerged from the implementation of S3, yet it may come up later. We consider the possibility of this limitation as a methodological constraint which, to some extent, was addressed through the longitudinal research conducted in Crete. In this regard, the longitudinal analysis was important not only in order to identify and describe patterns of S3 implementation change, but also to serve

for the identification of new emerging S3 elements which were not previously defined in our study for investigation.

Thirdly, a potential limitation arises from the restricted availability of updated secondary data, which has been used in this thesis to build, analyse and understand the case study profiles. In particular, the vast majority of the available secondary sources (e.g. regional indicators, official studies and state reports) neglect the way in which the macro-economic crisis in Greece has ultimately affected the regional ecosystems. Though this weakness does not affect the quality of our ultimate empirical findings, it is worth highlighting it as a potential limitation of this study.

10.4 Areas for future research

Arguably, there is still a great deal of room for additional research in the implementation of S3 at the regional level. Given that it is not self-evident that policy implementation practices can be sufficiently applied across diverse territories (Tödting and Trippel 2005), an important direction for future research is to examine the extent to which our academic and policy thinking on S3 implementation can be transferred to other regional contexts. This can be seen as part of the ongoing smart specialisation research, and it would require the conduct of additional similar studies in European catch-up regions, which currently face important difficulties in putting their S3 priorities into practice (Iacobucci and Guzzini 2016; Capello and Kroll 2016).

We built an empirical-based policy implementation model to understand how S3 development can be better examined, understood and addressed in the regional setting. Given that it has been created for the Cretan and CM environments particularly, our model requires testing in other regional contexts to find out whether its theoretical underpinnings are relevant for other European cases beyond our study regions, and to examine which of our policy suggestions can also be made for areas beyond Crete and CM. Drawing on a broader regional base that collects evidence from an additional number of catch-up regions, may lead to some conceptual and policy

improvements which will help to implement better the next generation of smart specialisation strategies.

References

- Abramovitz, Moses. 1986. "Catching Up, Forging Ahead, and Falling Behind." *The Journal of Economic History* 46 (2):385-406.
- Ács, Zoltán J., Erko Autio, and László Szerb. 2014. "National Systems of Entrepreneurship: Measurement issues and policy implications." *Research Policy* 43 (3):476-94. doi: <https://doi.org/10.1016/j.respol.2013.08.016>.
- Aghion, P, P David, and D Foray. 2009. "Science, technology and innovation for economic growth: Linking policy research and practice in 'STIG Systems'." *Research Policy* 38 (4):681-93. doi: 10.1016/j.respol.2009.01.016.
- Alpha965. 2017. "More than 14,000 firms in Thessaloniki went bankrupt." alpha965, Accessed 1 August <http://www.alpha965.gr/%CF%80%CE%AC%CE%BD%CF%89-%CE%B1%CF%80%CF%8C-14-000-%CE%BB%CE%BF%CF%85%CE%BA%CE%AD%CF%84%CE%B1-%CF%83%CE%B5-%CE%B2%CE%B9%CE%BF%CF%84%CE%B5%CF%87%CE%BD%CE%AF%CE%B5%CF%82-%CF%84%CE%B7%CF%82-%CE%B8%CE%B5/>.
- Amin, A. 1999. "An Institutionalist Perspective on Regional Economic Development." *International Journal of Urban and Regional Research* 23 (2):365-78. doi: doi:10.1111/1468-2427.00201.
- Amin, A, and N Thrift. 1995. "Globalisation and institutional thickness." In Healey, P. Cameron, S. Davaoudi, S. Graham, C., & Madani-Pour, A. (Eds.), *Managing cities: The New Urban context*, Chichester, NY, pp. 91–108.
- Anderson, A, S Dodd, and S Jack. 2010. "Network practices and entrepreneurial growth." *Scandinavian Journal of Management* 26 (2):121-33. doi: <http://dx.doi.org/10.1016/j.scaman.2010.01.005>.
- Andrews, M., L. Pritchett, and M. Woolcock. 2017. *Building State Capability: Evidence, Analysis, Action*: Oxford University Press.
- Aranguren, Mari José, Edurne Magro, Mikel Navarro, and James R. Wilson. 2018. "Governance of the territorial entrepreneurial discovery process: looking under the bonnet of RIS3." *Regional Studies*:1-11. doi: 10.1080/00343404.2018.1462484.
- Asheim, B. 1996a. "Industrial districts as 'learning regions': A condition for prosperity." *European Planning Studies* 4 (4):379-400. doi: 10.1080/09654319608720354.
- Asheim, B, R Boschma, and P Cooke. 2011. "Constructing Regional Advantage: Platform Policies Based on Related Variety and Differentiated Knowledge Bases." *Regional Studies* 45 (7):893-904.
- Asheim, B, and P. Cooke. 2011. *Handbook of Regional Innovation and Growth*: Edward Elgar.
- Asheim, B, and M Grillitsch. 2015. "Smart specialisation: Sources for new path development in a peripheral manufacturing region." *Lund University, Papers in Innovation Studies, Paper no. 2015/11*.
- Asheim, B, M Grillitsch, and M Trippel. 2016. "Smart Specialization as an innovation-driven strategy for economic diversification: Examples from Scandinavian regions." In.: Lund University, CIRCLE - Center for Innovation, Research and Competences in the Learning Economy.

- Asheim, B, A Isaksen, C Nauwelaers, and F Tödting. 2003. *Regional Innovation Policy for Small+Medium Enterprises*: Edward Elgar Publishing Limited.
- Asheim, Bjørn T. 1996b. "Industrial districts as 'learning regions': A condition for prosperity." *European Planning Studies* 4 (4):379-400. doi: 10.1080/09654319608720354.
- Avranas, A, and A Nioras. 2011. "Regional Innovation Report Kentriki Makedonia." *Regional Innovation Monitor project for DG Enterprise of the European Commission*.
- Bachtler, J, P Berkowitz, S Hardy, and T Muravska. 2017. *EU Cohesion Policy: Reassessing performance and direction*: London: Routledge.
- Baier, E, H Kroll, and A Zenker. 2013a. "Regional autonomy with regard to innovation policy: A differentiated illustration of the European status quo." *Working Papers Firms and Region R3/2013*.
- Baier, E., H. Kroll, and A. Zenker. 2013b. *Templates of Smart Specialisation: Experiences of Place-based Regional Development Strategies in Germany and Austria*: Fraunhofer ISI.
- Baland, Jean-Marie, Karl Ove Moene, and James A. Robinson. 2010. "Chapter 69 - Governance and Development*." In *Handbook of Development Economics*, edited by Rodrik Dani and Rosenzweig Mark, 4597-656. Elsevier.
- Balland, Pierre-Alexandre, Ron Boschma, Joan Crespo, and David L. Rigby. 2018. "Smart specialization policy in the European Union: relatedness, knowledge complexity and regional diversification." *Regional Studies*:1-17. doi: 10.1080/00343404.2018.1437900.
- Barca, F. 2009a. "An Agenda for a Reformed Cohesion Policy: a place-based approach to meeting European Union challenges and expectations: Independent Report prepared at the request of Danuta Hübner, Commissioner for Regional Policy." *European Commission*.
- Barca, F, P McCann, and A Rodríguez-Pose. 2012. "THE CASE FOR REGIONAL DEVELOPMENT INTERVENTION: PLACE-BASED VERSUS PLACE-NEUTRAL APPROACHES*." *Journal of Regional Science* 52 (1):134-52. doi: 10.1111/j.1467-9787.2011.00756.x.
- Barca, Fabrizio. 2009b. "An Agenda for a Reformed Cohesion Policy: A Place-Based Approach to Meeting European Union Challenges and Expectations." *Independent report prepared at the request of the European Commissioner for Regional Policy. Danuta Hübner European Commission, Brussels*.
- Becker, Sascha O., Peter H. Egger, and Maximilian von Ehrlich. 2012. "Too much of a good thing? On the growth effects of the EU's regional policy." *European Economic Review* 56 (4):648-68. doi: 10.1016/j.euroecorev.2012.03.001.
- Bell, M, and K Pavitt. 1995. "The Development of Technological Capabilities." in *Haque, I.U. (Ed.), Trade, Technology and International Competitiveness, World Bank, Washington, pp.69-101*.
- Benneworth, P. 2007. "Leading Innovation: Building Effective Regional Coalitions for Innovation, National Endowment for Science." *Technology and the Arts, (NESTA), Research Report, London, UK*.
- Berger, Suzanne. 2013. *Making in America From Innovation to Market*: MIT Press.
- Best, M.H. 2001. *The New Competitive Advantage: The Renewal of American Industry*: Oxford University Press.
- Beugelsdijk, Maaïke, and Sylvester C. W. Eijffinger. 2005. "The Effectiveness of Structural Policy in the European Union: An Empirical Analysis for the EU-15 in 1995–2001*." *JCMS: Journal of Common Market Studies* 43 (1):37-51. doi: 10.1111/j.0021-9886.2005.00545.x.

- Blaikie, N. 2009. *Designing Social Research*: Wiley.
- Boekholt, P, E Arnold, E Deiacio, S McKibbin, P Simmons, J Stroyan, and J Mothe. 2002. "The governance of research and innovation: an international comparative study." *Technopolis-Group, final synthesis report, Amsterdam*.
- Bosch, Frans A. J. Van Den, Henk W. Volberda, and Michiel De Boer. 1999. "Coevolution of Firm Absorptive Capacity and Knowledge Environment: Organizational Forms and Combinative Capabilities." *Organization Science* 10 (5):551-68. doi: 10.1287/orsc.10.5.551.
- Boschma, R, and G Capone. 2015. "Institutions and diversification: Related versus unrelated diversification in a varieties of capitalism framework." *Research Policy* 44 (10):1902-14. doi: <http://dx.doi.org/10.1016/j.respol.2015.06.013>.
- Boschma, R, and K Frenken. 2009. "Technological relatedness and regional branching." (In) *H. Bathelt, M.P. Feldman and D.F. Kogler (eds.) (2009), Dynamic Geographies of Knowledge Creation and Innovation, Routledge, Taylor and Francis*
- Boschma, R, and C Gianelle. 2014. "Regional Branching and Smart Specialisation Policy." *EC, Joint Research Centre, Institute for Prospective Technological Studies S3 Policy Brief Series No. 06/2014*.
- Boschma, R, G Heimeriks, and P-A Balland. 2014. "Scientific knowledge dynamics and relatedness in biotech cities." *Research Policy* 43 (1):107-14. doi: 10.1016/j.respol.2013.07.009.
- Boschma, R, and S Iammarino. 2009. "Related Variety, Trade Linkages, and Regional Growth in Italy." *Economic Geography* 85 (3):289-311. doi: 10.1111/j.1944-8287.2009.01034.x.
- Braun, Dietmar. 2008. "Organising the political coordination of knowledge and innovation policies." *Science and Public Policy* 35 (4):227-39. doi: 10.3152/030234208x287056.
- Bresnahan, Timothy F., and M. Trajtenberg. 1995. "General purpose technologies 'Engines of growth'?" *Journal of Econometrics* 65 (1):83-108. doi: [http://dx.doi.org/10.1016/0304-4076\(94\)01598-T](http://dx.doi.org/10.1016/0304-4076(94)01598-T).
- Bryman, A. 2004. *Social Research Methods*: Oxford University Press.
- Busetti, Simone. 2015. "Institutions, Institutional Change and Policy Outcomes." In *Governing Metropolitan Transport: Institutional Solutions for Policy Problems*, 29-51. Cham: Springer International Publishing.
- Camagni, Roberto, and Roberta Capello. 2015. "Rationale and design of EU cohesion policies in a period of crisis." *Regional Science Policy & Practice* 7 (1):25-47. doi: 10.1111/rsp3.12047.
- Cantwell, John, and Odile Janne. 1999. "Technological globalisation and innovative centres: the role of corporate technological leadership and locational hierarchy1." *Research Policy* 28 (2-3):119-44. doi: [http://dx.doi.org/10.1016/S0048-7333\(98\)00118-8](http://dx.doi.org/10.1016/S0048-7333(98)00118-8).
- Capello, R. 2014. "Smart Specialisation Strategy and the New EU Cohesion Policy Reform: Introductory Remarks." *Scienze Regionali* 13 (1):5-14.
- Capello, R, and H Kroll. 2016. "From theory to practice in smart specialization strategy: emerging limits and possible future trajectories." *European Planning Studies* 24 (8):1393-406. doi: 10.1080/09654313.2016.1156058.
- Cappelen, A, F Castellacci, J. Fagerberg, and B Verspagen. 2003. "The Impact of EU Regional Support on Growth and Convergence in the European Union." *Journal of Common Market Studies* 41:621-44.

- Cappelen, A, J Fagerberg, and B Verspagen. 1999. "Lack of Regional Convergence." in J. Fagerberg, P. Guerrieri and B. Verspagen (eds), *The Economic Challenge for Europe. Adapting to Innovation Based Growth*, Edward Elgar, chapter 6.
- Carayannis, E.G., and D.F.J. Campbell. 2011. *Mode 3 Knowledge Production in Quadruple Helix Innovation Systems: 21st-Century Democracy, Innovation, and Entrepreneurship for Development*: Springer New York.
- Carayannis, Elias G., and Ruslan Rakhmatullin. 2014. "The Quadruple/Quintuple Innovation Helixes and Smart Specialisation Strategies for Sustainable and Inclusive Growth in Europe and Beyond." *Journal of the Knowledge Economy* 5 (2):212-39. doi: 10.1007/s13132-014-0185-8.
- Chaniotis, A. 2010. "Ancient Crete." *Oxford Bibliographies Online: Classics* DOI: 10.1093/obo/9780195389661-0071 (LAST MODIFIED: 15 February 2010).
- Charles, D, F Gross, and J Bachtler. 2012. "Smart Specialisation and cohesion policy: a strategy or all regions? ." *IQ-Net Thematic paper* 30 (2).
- Christensen, C.M. 2015. *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*: Harvard Business Review Press.
- Clarysse, Bart, Mike Wright, Andy Lockett, Els Van de Velde, and Ajay Vohora. 2005. "Spinning out new ventures: a typology of incubation strategies from European research institutions." *Journal of Business Venturing* 20 (2):183-216. doi: <https://doi.org/10.1016/j.jbusvent.2003.12.004>.
- Coffano, M, and D Foray. 2014. *The Centrality of Entrepreneurial Discovery in Building and Implementing a Smart Specialisation Strategy*. Vol. 13.
- Cohen, Wesley M., and Daniel A. Levinthal. 1990. "Absorptive Capacity: A New Perspective on Learning and Innovation." *Administrative Science Quarterly* 35 (1):128-52. doi: 10.2307/2393553.
- Cooke, P, and O Memedovic. 2003. "Strategies for Regional Innovation Systems: Learning Transfer and Application." *Policy Papers, UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION, Vienna, 2003*.
- Cooke, P., B Asheim, R. Boschma, R. Martin, D. Schwartz, and F. Tödtling. 2011. *Handbook of Regional Innovation and Growth*: Edward Elgar Publishing Limited.
- Cooke, P., and K. Morgan. 1998a. *The Associational Economy: Firms, Regions, and Innovation*: Oxford University Press.
- Cooke, P.N. 2011. *Transition Regions: Regional-national Eco-innovation Systems and Strategies*: Elsevier.
- Cooke, P.N., and K. Morgan. 1998b. *The Associational Economy: Firms, Regions, and Innovation*: Oxford University Press.
- Cooke, Philip, Mikel Gomez Uranga, and Goio Etxebarria. 1997. "Regional innovation systems: Institutional and organisational dimensions." *Research Policy* 26 (4-5):475-91. doi: [http://dx.doi.org/10.1016/S0048-7333\(97\)00025-5](http://dx.doi.org/10.1016/S0048-7333(97)00025-5).
- Corner, Patricia D., and Shuyuan Wu. 2012. "Dynamic capability emergence in the venture creation process." *International Small Business Journal* 30 (2):138-60. doi: doi:10.1177/0266242611431092.
- Covin, J, and D Slevin. 1991. "Conceptual Model of Entrepreneurship as Firm Behavior " *Entrepreneurship Theory and Practice* 16 (1):7-25.
- Creswell, J.W. 2007. *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*: SAGE Publications.

- Danny, MacKinnon, Cumbers Andrew, Pike Andy, Birch Kean, and McMaster Robert. 2009. "Evolution in Economic Geography: Institutions, Political Economy, and Adaptation." *Economic Geography* 85 (2):129-50. doi: doi:10.1111/j.1944-8287.2009.01017.x.
- David, P., D. Forey, and B. Hall. 2012. "Measuring Smart Specialisation: The Concept and the Need for Indicators." *Knowledge for Growth Expert Group*.
- Davoudi, Simin, Nick Evans, Francesca Governa, and Marco Santangelo. 2008. *Territorial governance in the making. Approaches, methodologies, practices*.
- Delgado, Mercedes, Michael E. Porter, and Scott Stern. 2014. "Clusters, convergence, and economic performance." *Research Policy* 43 (10):1785-99. doi: 10.1016/j.respol.2014.05.007.
- Dosi, G, and F Malerba. 1996. "Organization and Strategy in the Evolution of the Enterprise." *Macmillan London*.
- Dunford, Mick, and Adrian Smith. 2000. "Catching Up or Falling Behind? Economic Performance and Regional Trajectories in the "New Europe"*. " *Economic Geography* 76 (2):169-95. doi: 10.1111/j.1944-8287.2000.tb00139.x.
- Ebers, M. 1999. *The Formation of Inter-organizational Networks*: Oxford University Press.
- EC. 2012. "Guide to Research and Innovation Strategies for Smart Specialisation " *Publications Office of the European Union, 2012*.
- . 2013. "The role of clusters in smart specialisation strategies." *DG Enterprise and Industry, European Commission*.
- . 2014a. "The EU explained: Digital agenda for Europe." *European Commission, Directorate-General for Communication Publications Office of the European Union, 2014*.
- . 2014b. "Investment for Jobs and Growth: Sixth Report on Economic, Social and Territorial Cohesion." *European Commission, Luxembourg: Publication Office of the European Union*.
- . 2014c. "Monitoring and Evaluation of European Cohesion Policy European Social Fund, Guidance Document on Indicators of Public Administration Capacity Building." *Employment, Social Affairs and Inclusion DG European Commission, EC*.
- . 2014d. "National/Regional Research and Innovation Strategies for Smart Specialisation (RIS3)." *European Commission, ISBN 92-894-0629-1*.
- . 2014e. "Regional Innovation Scoreboard 2014." *Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs*.
- . 2015. "Innovation Union Scoreboard." *Directorate J – Industrial Property, Innovation & Standard*.
- . 2016. "Regional Innovation Scoreboard 2016." *European Commission*.
- Ederveen, Sjef, Henri Groot, and Richard Nahuis. 2006. "Fertile Soil for Structural Funds? A Panel Data Analysis of the Conditional Effectiveness of European Cohesion Policy." *Kyklos* 59 (1):17-42. doi: doi:10.1111/j.1467-6435.2006.00318.x.
- Edquist, C. 2005. "Systems of innovation: perspectives and challenges." in *The Oxford Handbook of Innovation Eds J Fagerberg, D C Mowery, R R Nelson (Oxford University Press, Oxford) pp 181–208*.
- Edquist, C. 1997. *Systems of Innovation: Technologies, Institutions, and Organizations*: Pinter.
- Edwards, J, E Marinelli, E Arregui, and L Kempton. 2017. "Higher Education for Smart Specialisation Towards strategic partnerships for innovation." *S3 Policy Brief SeriesNo. 23/2017, Joint Research Centre (JRC)*.

- Eglene, Ophelia, Sharon S. Dawes, and Carrie A. Schneider. 2007. "Authority and Leadership Patterns in Public Sector Knowledge Networks." *The American Review of Public Administration* 37 (1):91-113. doi: doi:10.1177/0275074006290799.
- Eisenhardt, Kathleen M., and Jeffrey A. Martin. 2000. "Dynamic capabilities: what are they?" *Strategic Management Journal* 21 (10-11):1105-21. doi: 10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E.
- EKT. 2015a. "Innovation in Greek enterprises 2010-2012." *National Documentation Centre, 2015*.
- . 2015b. "The regional dimension of knowledge-intensive activities in Greece - Overview 2015." *Athens: National Documentation Centre*.
- . 2015c. "The regional dimension of knowledge intensive activities in Greece - Overview 2015 " *National Documentation Centre , National Hellenic Research Foundation, Athens*.
- ELSTAT. 2016. "Greece in figures, January - March 2016." *Hellenic Statistical Authority (ELSTAT)*.
- Endeavor, Greece. 2016. "Greek Business Exodus." *Endeavor Greece*.
- Ernst, D. 1994. "Network transactions, market structure and technological diffusion: Implications for South-South cooperation." in L. Mytelka (ed.), *South-South cooperation in a global perspective, Paris: Development Centre Documents, OECD, pp. 89-129*.
- Essletzbichler, Jürgen. 2015. "Relatedness, Industrial Branching and Technological Cohesion in US Metropolitan Areas." *Regional Studies* 49 (5):752-66. doi: 10.1080/00343404.2013.806793.
- Estensoro, Miren, and Miren Larrea. 2016. "Overcoming policy making problems in smart specialization strategies: engaging subregional governments." *European Planning Studies* 24 (7):1319-35. doi: 10.1080/09654313.2016.1174670.
- Etzkowitz, H, and Loet Leydesdorff. 1995. "The Triple Helix: University Industry Government Relations: A Laboratory for Knowledge Based Economic Development." *EASST Review* 14 (1):14-9.
- EU. 2015. "Regions in the European Union Nomenclature of territorial units for statistics NUTS 2013/EU-28." *Luxembourg: Publications Office of the European Union, 2015*.
- . 2016. "The role of Clusters in supporting the Smart Specialisation Thematic Platforms: Focus on Industrial Modernisation." *Policy Brief, Interreg Europe - Policy Learning Platform Research and Innovation*.
- Exporters' Association of Crete. 2017. "Cretan exports for 2016." Accessed 26 July. <http://www.crete-exporters.com/el/%cf%80%ce%bf%cf%81%ce%b5%ce%af%ce%b1-%cf%84%cf%89%ce%bd-%ce%ba%cf%81%ce%b7%cf%84%ce%b9%ce%ba%cf%8e%ce%bd-%ce%b5%ce%be%ce%b1%ce%b3%cf%89%ce%b3%cf%8e%ce%bd-%ce%b3%ce%b9%ce%b1-%cf%84%ce%bf-2016/>.
- Fagerberg, Jan, Maryann P. Feldman, and Martin Srholec. 2014. "Technological dynamics and social capability: US states and European nations." *Journal of Economic Geography* 14 (2):313-37. doi: 10.1093/jeg/lbt026.
- Fagerberg, Jan, and Bart Verspagen. 1996. "Heading for Divergence? Regional Growth in Europe Reconsidered*." *JCMS: Journal of Common Market Studies* 34 (3):431-48. doi: 10.1111/j.1468-5965.1996.tb00580.x.

- Farazmand, Ali. 2009. "Building Administrative Capacity for the Age of Rapid Globalization: A Modest Prescription for the Twenty-First Century." *Public Administration Review* 69 (6):1007-20. doi: 10.1111/j.1540-6210.2009.02054.x.
- Farole, Thomas, Andrés Rodríguez-Pose, and Michael Storper. 2011. "Human geography and the institutions that underlie economic growth." *Progress in Human Geography* 35 (1):58-80. doi: 10.1177/0309132510372005.
- Fetterman, D.M. 1989. *Ethnography: Step-by-Step*: SAGE Publications.
- Flanagan, Kieron, Elvira Uyarra, and Manuel Laranja. 2011. "Reconceptualising the 'policy mix' for innovation." *Research Policy* 40 (5):702-13. doi: 10.1016/j.respol.2011.02.005.
- Florida, Richard. 1995. "Toward the learning region." *Futures* 27 (5):527-36. doi: [http://dx.doi.org/10.1016/0016-3287\(95\)00021-N](http://dx.doi.org/10.1016/0016-3287(95)00021-N).
- Foray, D. 2012. "Smart Specialisation and the New Industrial Policy Agenda, Innovation for Growth." *i4 g Policy Brief No. 8 (Brussels: European Commission)*.
- . 2016. "On the policy space of smart specialization strategies." *European Planning Studies* 24 (8):1428-37. doi: 10.1080/09654313.2016.1176126.
- Foray, D, P.A David, and B Hall. 2011. "Smart specialization. From academic idea to political instrument, the surprising career of a concept and the difficulties involved in its implementation." *MTEI Working Paper*.
- Foray, D, and X Goenaga. 2013. "The Goals of Smart Specialisation." *S3 Policy Brief Series No.01/2013, European Commission, Joint Research Centre IPTS, Seville*.
- Foray, D, and Bart van Ark. 2007. "Smart specialisation." *Policy Brief No. 1, Expert Group Knowledge for Growth, European Commission*.
- Foray, D. 2014. *Smart Specialisation: Opportunities and Challenges for Regional Innovation Policy*: Taylor & Francis.
- Forbes, N., and D. Wield. 2002. *From Followers to Leaders: Managing Technology and Innovation in Newly Industrializing Countries*: Routledge.
- Fotakis, Costas, Magdalene Rosenmöller, John Brennan, Liviu Matei, Roumen Nikolov, Caroline Petiot, and Jaana Puukka. 2014. *The Role of Universities and Research Centres as Drivers for Smart Specialisation at Regional Level*.
- Frenken, Koen, Frank Van Oort, and Thijs Verburg. 2007. "Related Variety, Unrelated Variety and Regional Economic Growth." *Regional Studies* 41 (5):685-97. doi: 10.1080/00343400601120296.
- Fritsch, Michael. 1992. "Regional Differences in New Firm Formation: Evidence from West Germany." *Regional Studies* 26 (3):233-41. doi: 10.1080/00343409212331346931.
- Fujita, K. 2013. *Cities and Crisis: New Critical Urban Theory*: SAGE Publications.
- Gertler, Meric S. 2010. "Rules of the Game: The Place of Institutions in Regional Economic Change." *Regional Studies* 44 (1):1-15. doi: 10.1080/00343400903389979.
- Gianelle, C, and A Kleibrink. 2015. "Monitoring Mechanisms for Smart Specialisation Strategies." *S3 Policy Brief Series No. 13/2015 European Commission, Joint Research Centre*.
- Gianelle, C, D Kyriakou, Cohen C, and M Przeor. 2016. "Implementing Smart Specialisation: A Handbook." *Brussels: European Commission, EUR 28053 EN, doi:10.2791/53569*.
- Gianelle, Carlo, Xabier Goenaga, Ignacio González Vázquez, and Mark Thissen. 2014. "Smart specialisation in the tangled web of European inter-regional trade." *European Journal of Innovation Management* 17 (4):472-91. doi: doi:10.1108/EJIM-10-2013-0113.

- Grillitsch, Markus. 2015. "Institutions, smart specialisation dynamics and policy." *Environment and Planning C: Government and Policy*. doi: 10.1177/0263774x15614694.
- Grillitsch, Markus, and Magnus Nilsson. 2015. "Innovation in peripheral regions: Do collaborations compensate for a lack of local knowledge spillovers?" *The Annals of Regional Science* 54 (1):299-321. doi: 10.1007/s00168-014-0655-8.
- Grillo, F, and M Landabaso. 2011. "Merits, problems and paradoxes of regional innovation policies." *Local Economy* 26 (6-7):544-61. doi: 10.1177/0269094211417161.
- GSRT. 2000. "Operational Program "Research and Technology-EPET II", Subprogram III." *General Secretariat for Research and Technology*.
- . 2012. "National Research and Innovation Strategy for Smart Specialisation 2014-2020." *General Secretariat for Research and Technology (GSRT), Ministry for Education, Research and Religious Affairs*.
- Håkansson, H, and I Snehota. 1989. "No business is an island: The network concept of business strategy." *Scandinavian Journal of Management* 5 (3):187-200. doi: [http://dx.doi.org/10.1016/0956-5221\(89\)90026-2](http://dx.doi.org/10.1016/0956-5221(89)90026-2).
- Håkansson, H., D.I. Ford, L.E. Gadde, I. Snehota, and A. Waluszewski. 2010. *Business in Networks*: Wiley.
- Hancock, D.R., and R. Algozzine. 2006. *Doing Case Study Research: A Practical Guide for Beginning Researchers*: Teachers College Press.
- Hassink, R. 2010. "Locked in decline? On the role of regional lock-ins in old industrial areas". " in *The Handbook of Evolutionary Economic Geography* Eds R Boschma, R Martin (Edward Elgar, Cheltenham) pp 450 - 468.
- Hausmann, Ricardo, and Dani Rodrik. 2003. "Economic development as self-discovery." *Journal of Development Economics* 72 (2):603-33. doi: 10.1016/s0304-3878(03)00124-x.
- Healey, P. 1998. "Building Institutional Capacity through Collaborative Approaches to Urban Planning." *Environment and Planning A: Economy and Space* 30 (9):1531-46. doi: 10.1068/a301531.
- Hedrick, T.E., L. Bickman, and D.J. Rog. 1993. *Applied Research Design: A Practical Guide*: SAGE Publications.
- Heidenreich, M. 2005. "The renewal of regional capabilities." *Research Policy* 34 (5):739-57. doi: 10.1016/j.respol.2005.04.004.
- Howells, J., and J. Bessant. 2012. "Introduction: Innovation and economic geography: a review and analysis." *Journal of Economic Geography* 12 (5):929-42. doi: 10.1093/jeg/lbs029.
- Howells, J. R. L. 1999. "Regional Systems of Innovation?" in *Archibugi, D., Howells, J. and Michie, J. (Eds), Innovation Policy in a Global Economy*, Cambridge University Press, Cambridge, pp.67-93.
- Hughes, Alan. 2012. "Choosing races and placing bets: UK national innovation policy and the globalisation of innovation systems." In *Greenaway, D. (2013), The UK in a Global World, How Can the UK Focus on Steps in Global Value Chains that Really Add Value? BIS e-book, CEPR and Department for Business, Innovation and Skills*.
- Iacobucci, D. 2014. "Designing and implementing a smart specialisation strategy at regional level: Some open questions." *Scienze Regionali, Italian Journal of Regional Science* 13 (1):107-26.
- Iacobucci, Donato, and Enrico Guzzini. 2016. "Relatedness and connectivity in technological domains: missing links in S3 design and implementation." *European Planning Studies* 24 (8):1511-26. doi: 10.1080/09654313.2016.1170108.

- Iammarino, S, P Mariacristina, M Vivarelli, and N von Tunzelmann. 2012. "Technological capabilities and patterns of cooperation of UK firms: a regional investigation." *Regional Studies* 46 (10):1-19.
- Iammarino, S, A Rodriguez-Pose, and M Storper. 2017. "Why Regional Development Matters for Europe's Economic Future." *Working Papers 07/2017, Directorate-General Regional and Urban Policy, European Commission*.
- Ireland, R., J Covin, and D Kuratko. 2009. "Conceptualizing Corporate Entrepreneurship Strategy." *Entrepreneurship Theory and Practice* 33 (1):19-46. doi: 10.1111/j.1540-6520.2008.00279.x.
- Isaksen, A. 2001. "Building regional innovation systems: is endogenous industrial development possible in the global economy?" *Canadian Journal of Regional Science* 1:101-20.
- Isaksen, A, and M Trippel. 2014. "Regional industrial path development in different regional innovation systems: A conceptual analysis." *Papers in Innovation Studies, Paper no. 2014/17*.
- Jorgensen, D.L. 1989. *Participant Observation: A Methodology for Human Studies*: SAGE Publications.
- Jütting, J. 2003. "Institutions and Development: A Critical Review." *OECD Development Centre Working Papers 210, OECD Publishing*.
- Karo, E, and R Kattel. 2015. "Economic development and evolving state capacities in Central and Eastern Europe: can "smart specialization" make a difference?" *Journal of Economic Policy Reform* 18 (2):172-87. doi: 10.1080/17487870.2015.1009068.
- Kathimerini. 2018. "Cafes and restaurants are 90% of new business ventures " Kathimerini Newspaper, Accessed 17 January.
<http://www.kathimerini.gr/502429/article/oikonomia/epixeirhseis/kafeteries-kai-estiatoria-to-90-newn-epixeirhsewn>.
- . 2017. "Brain drain has increased in the age of forties." Kathimerini, Athens Accessed 5 July. <http://www.kathimerini.gr/907696/article/epikairothta/ellada/ay3h8hke-h-diarroh-sarantarhdwn>.
- Kempson, E, S Collard, and N Moore. 2005. "Measuring financial capability: An exploratory study." *Financial Services Authority. Consumer Research Report 37, June 2005*.
- Kempton, L, J Goddard, J Edwards, F Barbara Hegyi, and S-E Pérez. 2013. "Universities and Smart Specialisation " *S3 Policy Brief Series No. 03/2013, European Commission, Joint Research Centre*.
- Kim, L. 1997. *Imitation to Innovation: The Dynamics of Korea's Technological Learning*: Harvard Business School Press.
- Kim, Linsu. 1980. "Stages of development of industrial technology in a developing country: A model." *Research Policy* 9 (3):254-77. doi: [http://dx.doi.org/10.1016/0048-7333\(80\)90003-7](http://dx.doi.org/10.1016/0048-7333(80)90003-7).
- Kirner, E, S Kinkel, and A Jaeger. 2009. "Innovation paths and the innovation performance of low-technology firms—An empirical analysis of German industry." *Research Policy* 38 (3):447-58. doi: <https://doi.org/10.1016/j.respol.2008.10.011>.
- Komninos, N, Bernard Musyck, and A Reid. 2014. "Smart specialisation strategies in south Europe during crisis." *European Journal of Innovation Management* 17 (4):448-71. doi: [doi:10.1108/EJIM-11-2013-0118](https://doi.org/10.1108/EJIM-11-2013-0118).
- Komninos, N. 2013. *Intelligent Cities: Innovation, Knowledge Systems and Digital Spaces*: Taylor & Francis.

- Koschatzky, Knut. 2005. "The regionalization of innovation policy: New options for regional change?" In *Rethinking Regional Innovation and Change: Path Dependency or Regional Breakthrough?*, edited by Gerhard Fuchs and Philip Shapira, 291-312. New York, NY: Springer New York.
- Kroll, H. 2015a. "Efforts to Implement Smart Specialization in Practice—Leading Unlike Horses to the Water." *European Planning Studies* 23 (10):2079-98. doi: 10.1080/09654313.2014.1003036.
- . 2015b. "Weaknesses and Opportunities of RIS3-type Policies, Seven Theses." *Fraunhofer Institute for Systems and Innovation Research ISI*.
- . 2016. "Policy Brief on Smart Specialisation." *Fraunhofer Institute for Systems and Innovation Research IS*.
- Kroll, H, E Muller, E Schnabl, and A Zenker. 2014. "From smart concept to challenging practice: How European regions deal with the commission's request for novel innovation strategies." *Working paper Policy and Region* (No. R2/2014) (Fraunhofer ISI).
- Kyriakou, D. 2014. "Economic Impact of Smart Specialization and Research in Advanced Adaptive Systems in a Monetary Union." In *López Peláez, A., (2014), The Robotics Divide: A New Frontier in the 21st Century?*, Springer London:41-78.
- Kyriakou, D., M.P. Martínez, I. Perriáñez-Forte, and A. Rainoldi. 2016. *Governing Smart Specialisation*: Taylor & Francis.
- Lakshmanan, T.R. , and K Button. 2009. "Institutions and regional development." in *Handbook of Regional Growth and Development Theories*, Capello, R. and Nijkamp, P.
- Lall, S. 1992. "Technological Capabilities and Industrialization." *World Development* 20:165-86.
- . 1998. "Exports of manufactures by developing countries: emerging patterns of trade and location." *Oxford Review of Economic Policy* 14 (2):54-73. doi: 10.1093/oxrep/14.2.54.
- Lall, S. 1987. *Learning to industrialize: the acquisition of technological capability by India*: Macmillan Press.
- Landabaso, M. 2014. "Guest editorial on research and innovation strategies for smart specialisation in Europe: Theory and practice of new innovation policy approaches." *European Journal of Innovation Management* 17 (4):378-89. doi: doi:10.1108/EJIM-08-2014-0093.
- Landabaso, M, and D Foray. 2014. "From smart specialisation to smart specialisation policy." *European Journal of Innovation Management* 17 (4):492-507. doi: 10.1108/ejim-09-2014-0096.
- Landabaso, M, C Gianelle, X Goenaga, I González Vázquez, and M Thissen. 2014. "Smart specialisation in the tangled web of European inter-regional trade." *European Journal of Innovation Management* 17 (4):472-91. doi: 10.1108/ejim-10-2013-0113.
- Landabaso, M, N Komninos, B Musyck, and A Iain Reid. 2014. "Smart specialisation strategies in south Europe during crisis." *European Journal of Innovation Management* 17 (4):448-71. doi: 10.1108/ejim-11-2013-0118.
- Landabaso, M, J Valdaliso, E Magro, M Navarro, M Jose Aranguren, and J Wilson. 2014. "Path dependence in policies supporting smart specialisation strategies." *European Journal of Innovation Management* 17 (4):390-408. doi: 10.1108/ejim-12-2013-0136.
- Landabaso, Mikel, Luke Georghiou, and Elvira Uyarra, Ramona Saliba Scerri, Nadine Castillo, and Jennifer Cassingena Harper. 2014. "Adapting smart specialisation to a micro-

- economy – the case of Malta." *European Journal of Innovation Management* 17 (4):428-47. doi: 10.1108/ejim-03-2014-0026.
- Landabaso, Mikel, Philip McCann, and Raquel Ortega-Argilés. 2014. "Smart specialisation in European regions: issues of strategy, institutions and implementation." *European Journal of Innovation Management* 17 (4):409-27. doi: 10.1108/ejim-05-2014-0052.
- Lawson, B, and D Samson. 2001. "Developing innovation capability in organisations: A dynamic capabilities approach." *International Journal of Innovation Management* 05 (03):377-400. doi: 10.1142/s1363919601000427.
- Lodge, M., and K. Wegrich. 2014. *The Problem-solving Capacity of the Modern State: Governance Challenges and Administrative Capacities*: OUP Oxford.
- Lovering, J. 1996. "New myths of the Welsh economy." *Planet* 116:6-16.
- Luke, G, and Elvira Uyarra, Ramona Saliba Scerri, Nadine Castillo, and Jennifer Cassingena Harper. 2014. "Adapting smart specialisation to a micro-economy – the case of Malta." *European Journal of Innovation Management* 17 (4):428-47. doi: doi:10.1108/EJIM-03-2014-0026.
- Lundquist, K, and M Tripl. 2013. "Distance, Proximity and Types of Cross-border Innovation Systems: A Conceptual Analysis." *Regional Studies* 47 (3):450–60.
- Lundvall, B-A, and B Johnson. 1994. "The Learning Economy." *Routledge, London*.
- Lundvall, B.Å. 2010. *National Systems of Innovation: Toward a Theory of Innovation and Interactive Learning*: Anthem Press.
- Luo, Y. 1999. *Entry and Cooperative Strategies in International Business Expansion*: Quorum.
- Mahoney, J, and K Thelen. 2009. "A Theory of Gradual Institutional Change." In *Explaining Institutional Change: Ambiguity, Agency, and Power*, 1-37. Cambridge: Cambridge University Press.
- Malerba, Franco. 1992. "Learning by Firms and Incremental Technical Change." *The Economic Journal* 102 (413):845-59. doi: 10.2307/2234581.
- Malmberg, Anders, and Peter Maskell. 1997. "Towards an explanation of regional specialization and industry agglomeration." *European Planning Studies* 5 (1):25-41. doi: 10.1080/09654319708720382.
- Marinelli, E, and I Perianez-Forte. 2017. "Smart Specialisation at work: The entrepreneurial discovery as a continuous process." *Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-74377-1, doi:10.2760/514714, JRC108571*.
- Marlow, David, and Kevin Richardson. 2016. "How smart is England's approach to smart specialization? A policy paper." *European Planning Studies* 24 (8):1478-93. doi: 10.1080/09654313.2016.1179267.
- Marques, Pedro, and Kevin Morgan. 2018. *The Heroic Assumptions of Smart Specialisation: A Sympathetic Critique of Regional Innovation Policy*.
- Marshall, C., and G.B. Rossman. 2006. *Designing Qualitative Research*: Sage Publications.
- Martin, R, and M Tripl. 2014. "System Failures, Knowledge Bases and Regional Innovation Policies." *disP - The Planning Review* 50 (1):24-32. doi: 10.1080/02513625.2014.926722.
- Martin, Ron, and Peter Sunley. 2006. "Path dependence and regional economic evolution." *Journal of Economic Geography* 6 (4):395-437. doi: 10.1093/jeg/lbl012.
- Maskell, P, and A Malmberg. 1999. "Localised learning and industrial competitiveness." *Cambridge Journal of Economics* 23 (2):167-85. doi: 10.1093/cje/23.2.167.
- Mason, J. 2002. *Qualitative Researching*: SAGE Publications.

- Mastroeni, M., J. Tait, and A. Rosiello. 2013. "Regional innovation policies in a globally connected environment." *Science and Public Policy* 40 (1):8-16. doi: 10.1093/scipol/scs115.
- Mazzucato, M. 2018. *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*: Penguin Books Limited.
- McCann, P, and R Ortega-Argilés. 2014. "Smart specialisation in European regions: issues of strategy, institutions and implementation." *European Journal of Innovation Management* 17 (4):409-27. doi: 10.1108/ejim-05-2014-0052.
- . 2015. "Smart Specialization, Regional Growth and Applications to European Union Cohesion Policy." *Regional Studies* 49 (8):1291-302. doi: 10.1080/00343404.2013.799769.
- . 2016a. "The early experience of smart specialization implementation in EU cohesion policy." *European Planning Studies* 24 (8):1407-27. doi: 10.1080/09654313.2016.1166177.
- McCann, P. 2015. *The Regional and Urban Policy of the European Union: Cohesion, Results-Oriented and Smart Specialisation*: Edward Elgar Publishing Limited.
- McCann, P., and R. Ortega-Argiles. 2013a. "Modern regional innovation policy." *Cambridge Journal of Regions, Economy and Society* 6 (2):187-216. doi: 10.1093/cjres/rst007.
- . 2013b. "Transforming European regional policy: a results-driven agenda and smart specialization." *Oxford Review of Economic Policy* 29 (2):405-31. doi: 10.1093/oxrep/grt021.
- McCann, P., and L. Oxley. 2012. *Innovation, Entrepreneurship, Geography and Growth*: Wiley.
- McCann, P., F. van Oort, and J. Goddard. 2016. *The Empirical and Institutional Dimensions of Smart Specialisation*: Taylor & Francis.
- McCann, Philip, and Raquel Ortega-Argilés. 2016b. "Smart specialisation, entrepreneurship and SMEs: issues and challenges for a results-oriented EU regional policy." *Small Business Economics* 46 (4):537-52. doi: 10.1007/s11187-016-9707-z.
- McGrath, Helen, and Thomas O'Toole. 2013. "Enablers and inhibitors of the development of network capability in entrepreneurial firms: A study of the Irish micro-brewing network." *Industrial Marketing Management* 42 (7):1141-53. doi: <http://dx.doi.org/10.1016/j.indmarman.2013.07.008>.
- Miguélez, Ernest, and Rosina Moreno. 2015. "Knowledge flows and the absorptive capacity of regions." *Research Policy* 44 (4):833-48. doi: <http://dx.doi.org/10.1016/j.respol.2015.01.016>.
- Miles, M, and A Huberman. 1994. "Qualitative data analysis." *California: Sage Publications Inc.*
- Milio, Simona. 2008. "How Political Stability Shapes Administrative Performance: The Italian Case." *West European Politics* 31 (5):915-36. doi: 10.1080/01402380802234581.
- Mitra, James. 2006. "'Genetic exceptionalism' and precautionary politics: Regulating for uncertainty in Britain's genetics and insurance policy process." *Science and Public Policy* 33 (8):585-600. doi: 10.3152/147154306781778713.
- Moodysson, J, M Trippel, and E Zukauskaitė. 2015. "Policy Learning and Smart Specialization, Exploring Strategies for Regional Industrial Change." *CIRCLE, Lund University*.
- Morgan, K. 2013. "The regional state in the era of Smart Specialisation." *EKONOMIAZ. Revista vasca de Economía, Gobierno Vasco / Eusko Jaurlaritza / Basque Government, vol. 83(02), pages 103-126*.

- Morgan, K., and C. Nauwelaers. 2004. *Regional Innovation Strategies: The Challenge for Less-Favoured Regions*: Taylor & Francis.
- Morgan, Kevin. 1997. "The Learning Region: Institutions, Innovation and Regional Renewal." *Regional Studies* 31 (5):491-503. doi: 10.1080/00343409750132289.
- . 2015. "Smart Specialisation: Opportunities and Challenges for Regional Innovation Policy." *Regional Studies* 49 (3):480-2. doi: 10.1080/00343404.2015.1007572.
- . 2016. "Collective entrepreneurship: the Basque model of innovation." *European Planning Studies* 24 (8):1544-60. doi: 10.1080/09654313.2016.1151483.
- . 2017. "Nurturing novelty: Regional innovation policy in the age of smart specialisation." *Environment and Planning C: Politics and Space* 35 (4):569-83. doi: 10.1177/0263774x16645106.
- Neffke, F, M Hartog, R Boschma, and M Henning. 2014. "Agents of structural change. The role of firms and entrepreneurs in regional diversification." *Papers in Evolutionary Economic Geography, Urban & Regional Research Centre Utrecht, Utrecht Unive.*
- Neffke, F, M Henning, and R Boschma. 2011. "How Do Regions Diversify over Time? Industry Relatedness and the Development of New Growth Paths in Regions." *Economic Geography* 87 (3):237-65. doi: 10.1111/j.1944-8287.2011.01121.x.
- Newbert, Scott L., Shanthi Gopalakrishnan, and Bruce A. Kirchoff. 2008. "Looking beyond resources: Exploring the importance of entrepreneurship to firm-level competitive advantage in technologically intensive industries." *Technovation* 28 (1–2):6-19. doi: <http://dx.doi.org/10.1016/j.technovation.2007.07.002>.
- North, D.C. 1990. *Institutions, Institutional Change and Economic Performance*: Cambridge University Press.
- North, Douglass C. 1989. "Institutions and economic growth: An historical introduction." *World Development* 17 (9):1319-32. doi: [http://dx.doi.org/10.1016/0305-750X\(89\)90075-2](http://dx.doi.org/10.1016/0305-750X(89)90075-2).
- . 2005. "The Contribution of the New Institutional Economics to an Understanding of the Transition Problem." In *Wider Perspectives on Global Development*, 1-15. London: Palgrave Macmillan UK.
- Novak, Joseph D., and D. Bob Gowin. 1984. *Learning How to Learn*. Cambridge: Cambridge University Press.
- OECD. 2001. *Cities and Regions in the New Learning Economy*: OECD Publishing.
- . 2005. "Working Party on Territorial Policy in Rural Areas, Place-Based Policies for Rural Development Crete, Greece (Case Study)." *Document approved by the Working Party on Territorial Policy in Rural Areas at its 7th Session on 30 November 2005*.
- . 2006. "The challenge of capacity development. Working towards good practice." *The Organisation for Economic Co-operation and Development (OECD)*.
- . 2011a. *OECD Reviews of Regional Innovation Regions and Innovation Policy*: OECD Publishing.
- . 2011b. *Regions at a Glance 2011*: OECD Publishing.
- . 2012a. "Draft Synthesis Report on Innovation Driven- Growth in Regions: The Role of Smart Specialisation." (OECD, Paris.).
- . 2012b. *Redefining "Urban": A New Way to Measure Metropolitan Areas*: OECD Publishing, Paris.
- . 2013. "Innovation-driven Growth in Regions: The Role of Smart Specialisation." *Secretary General of the OECD*.
- . 2017a. *Multi-level Governance Reforms*: OECD Publishing.

- . 2017b. *OECD Territorial Reviews OECD Territorial Reviews: Sweden 2017 Monitoring Progress in Multi-level Governance and Rural Policy: Monitoring Progress in Multi-level Governance and Rural Policy*: OECD Publishing.
- Ohkawa, K, and H Rosovsky. 1974. "Japanese Economic Growth." *Stanford University, Press Stanford*.
- Ortega-Argilés, Raquel. 2012. "The Transatlantic Productivity Gap: A Survey of the Main Causes." *Journal of Economic Surveys* 26 (3):395-419. doi: 10.1111/j.1467-6419.2012.00725.x.
- Oughton, Christine, Mikel Landabaso, and Kevin Morgan. 2002. "The Regional Innovation Paradox: Innovation Policy and Industrial Policy." *The Journal of Technology Transfer* 27 (1):97-110. doi: 10.1023/a:1013104805703.
- Papaioannou, Theo, Andrew Watkins, Dinar Kale, and Julius Mugwagwa. 2018. "Politics of innovation and development: The role of industry associations in integrating political, bureaucratic, industrial and health systems in India and South Africa." *Development Policy Review* 36 (S1):O531-O51. doi: doi:10.1111/dpr.12308.
- Papamichail, G, and A Saitakis. 2013. "Assessment of innovation level in Greece, FINNO Innovation Assessment Scoreboard " *Work published in FINNO Mechanism for fostering innovation in South East Europe Project*.
- Patel, Pankaj C., and James O. Fiet. 2011. "Knowledge Combination and the Potential Advantages of Family Firms in Searching for Opportunities." *Entrepreneurship Theory and Practice* 35 (6):1179-97. doi: 10.1111/j.1540-6520.2011.00497.x.
- Patricia, K, and P Tea. 2017. "Implementing a smart specialisation strategy: an evidence-based approach." *International Review of Administrative Sciences* 83 (1):85-105. doi: 10.1177/0020852315574994.
- Patton, M.Q. 2002. *Qualitative Research & Evaluation Methods*: SAGE Publications.
- . 2008. *Utilization-Focused Evaluation*: SAGE Publications.
- Pritchett, Lant, Michael Woolcock, and Matt Andrews. 2013. "Looking Like a State: Techniques of Persistent Failure in State Capability for Implementation." *The Journal of Development Studies* 49 (1):1-18. doi: 10.1080/00220388.2012.709614.
- Putnam, R.D., R. Leonardi, and R.Y. Nanetti. 1994. *Making Democracy Work: Civic Traditions in Modern Italy*: Princeton University Press.
- Radosevic, S., A. Curaj, R. Gheorghiu, L. Andreescu, and I. Wade. 2017. *Advances in the Theory and Practice of Smart Specialization*: Elsevier Science.
- Reek, W. 2013. "RIS3 Governance Guide, S3 Platform." *S3 Platform, the Northern Netherlands Alliance*.
- Region of Central Macedonia. 2018. "The Region of Central Macedonia sets an one-stop-shop for innovation and antrepreneurship." Accessed 2 January 2018. <http://www.pkm.gov.gr/default.aspx?lang=el-GR&page=35&pressid=16547>.
- Region of CM. 2014. "Central Macedonian Operational Programme." *2014GR16M2OP002*.
- . 2015. "The smart specialization strategy (RIS3) in the Region of Central Macedonia." *Region of Central Macedonia*.
- Region of Crete. 2015. "Smart Specialisation Strategy of Crete Region " *Region of Crete, March 2015*.
- Reid, A, N Komninos, J Sanchez, and P Tsanakas. 2012a. "RIS3 Assessment: Central Macedonia." *A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus*

- . 2012b. "RIS3 National Assessment: Greece. Smart Specialisation as a Means to Foster Economic Renewal " *Report to the European Commission*.
- . 2012c. "RIS3 Regional Assessment: Crete." *European Commission, DG Regio*.
- Reid, A, and P Stanovnik. 2013. "The Development of a Smart Specialisation Strategy (S3) for Slovenia, report to the European Commission." *DG Research & Innovation, Brussels: European Commission*.
- Reppel, K. 2012. "Research and Innovation Strategies for Smart Specialisation (RIS3)." *DG Regional Policy, European Commission*.
- Reynolds, P. D, S. M Camp, W Bygrave, E Autio, and M Hay. 2002. "Global Entrepreneurship Monitor 2001." *Executive Report, Babson College, London Business School*.
- Richards, L. 1999. *Using NVIVO in Qualitative Research*: SAGE Publications.
- RIM. 2016. "Region of Kriti." *Regional Innovation Monitor project for DG Enterprise of the European Commission*.
- Rodrigues, C, and L Fonseca. 2017. *Smart specialisations strategies and the role of universities in the entrepreneurial process of discovery: a critical appraisal*.
- Rodríguez-Pose, A, and T Ketterer. 2018. "Institutional change and the development of lagging regions in Europe." *Working Papers. Collection A: Public economics, governance and decentralization 1808, Universidade de Vigo, GEN - Governance and Economics research Network*.
- Rodriguez-Pose, A, and C Wilkie. 2015. "Institutions and the Entrepreneurial Discovery Porcess for Smart Specialisation." *Papers in Evolutionary Economic Geography, 15.23*.
- Rodríguez-Pose, A, and C Wilkie. 2017. "Revamping local and regional development through place-based strategies." *Cityscape 19 (1):151-70*.
- Rodríguez-Pose, Andrés. 2013. "Do Institutions Matter for Regional Development?" *Regional Studies 47 (7):1034-47*. doi: 10.1080/00343404.2012.748978.
- Rodríguez-Pose, Andrés, and Marco Di Cataldo. 2015. "Quality of government and innovative performance in the regions of Europe." *Journal of Economic Geography 15 (4):673-706*. doi: 10.1093/jeg/lbu023.
- Rodríguez-Pose, Andrés, and Enrique Garcilazo. 2015. "Quality of Government and the Returns of Investment: Examining the Impact of Cohesion Expenditure in European Regions." *Regional Studies 49 (8):1274-90*. doi: 10.1080/00343404.2015.1007933.
- Rodrik, D. 2008. "The New Development Economics: We Shall Experiment, but How Shall We Learn?" *HKS Working Paper No. RWP08-055*.
- Rodrik, D. 2001. "The future of economic convergence." *Harvard University, paper prepared for the 2011 Jackson Hole Symposium of the Federal Reserve Bank of Kansas City*.
- Rodrik, Dani. 2004a. "Getting Institutions Right." *CESifo DICE Report 2/2004. Munich: Ifo Institute for Economic Research*.
- . 2004b. "Industrial Policy for the Twenty-First Century." In.: Harvard University, John F. Kennedy School of Government.
- . 2005. "Chapter 14 Growth Strategies." In *Handbook of Economic Growth*, edited by Philippe Aghion and Steven N. Durlauf, 967-1014. Elsevier.
- Rodrik, Dani, and Mark R. Rosenzweig. 2010. "Preface: Development Policy and Development Economics: An Introduction*." In *Handbook of Development Economics*, edited by Rodrik Dani and Rosenzweig Mark, xv-xxvii. Elsevier.

- Rosiello, A, M Mastroeni, M Teubal, and G Avnimelech. 2013. "Evolutionary policy targeting: towards a conceptual framework for effective policy intervention." *Technology Analysis & Strategic Management* 25 (7):753-72. doi: 10.1080/09537325.2013.815715.
- Schramm, W. 1971. "Notes on case studies for instructional media projects." *Working paper for Academy of Educational Development, Washington DC.*
- Scott, J. 1990. *A Matter of Record: Documentary Sources in Social Research*: Wiley.
- Shankar, R , and Anwar Shah. 2009. *Lessons from European Union policies for regional development*. Edited by Poverty Reduction and Economic Management Division The World Bank: The World Bank, Poverty Reduction and Economic Management Division
- Shapira, Philip. 2005. "Innovation challenges and strategies in catch-up regions." In *Rethinking Regional Innovation and Change: Path Dependency or Regional Breakthrough?*, edited by Gerhard Fuchs and Philip Shapira, 195-221. New York, NY: Springer New York.
- Shaxson, Louise. 2005. *Is Your Evidence Robust Enough? Questions for Policy Makers and Practitioners*. Vol. 1.
- Sörvik, J , I Midtkandal, C Marzocchi, and Elvira Uyarra. 2016. "Results from a survey on inter-regional collaboration in Smart Specialisation Strategies (RIS3)." *S3 Policy Brief Series, No. 16/2016.*
- Sternberg, R. 2011. "Regional determinants of entrepreneurial activities – theories and empirical evidence." in *Fritsch, M. (Ed.), Handbook of Research on Entrepreneurship and Regional Development: National and Regional Perspectives*, Edward Elgar, Cheltenham, pp. 33-58.
- Storper, M. 1997. *The Regional World: Territorial Development in a Global Economy*: Guilford Press.
- Strambach, S. 2010. "Path dependence and path plasticity: the co-evolution of institutions and innovation—the German customized business software industry." in *The Handbook of Evolutionary Economic Geography* Eds R Boschma, R Martin (Edward Elgar, Cheltenham) pp 406–429.
- Streeck, W. 1991. *On institutional conditions of diversified quality production*.
- Sullivan Mort, Gillian, and Jay Weerawardena. 2006. "Networking capability and international entrepreneurship: How networks function in Australian born global firms." *International Marketing Review* 23 (5):549-72. doi: doi:10.1108/02651330610703445.
- Teece, David J., Gary Pisano, and Amy Shuen. 1997. "Dynamic capabilities and strategic management." *Strategic Management Journal* 18 (7):509-33. doi: 10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z.
- TenHouten, WD, J Stern, and D TenHouten. 1971. "Political Leadership in Poor Communities - Applications of Two Sampling Methodologies." In: *Orleans, P, Ellis, WR (eds) Race, Change, and Urban Society, vol. 5 of Urban Affairs Annual Reviews*. Beverly Hills, CA: Sage, 215–54.
- Thissen, M., F. van Oort, D. Diodato, and A. Ruijs. 2013. *Regional Competitiveness and Smart Specialization in Europe: Place-based Development in International Economic Networks*: Edward Elgar Publishing.
- Todtling, F., B Asheim, and R. Boschma. 2013. "Knowledge sourcing, innovation and constructing advantage in regions of Europe." *European Urban and Regional Studies* 20 (2):161-9. doi: 10.1177/0969776412457173.
- Tödting, Franz, and Michaela Trippel. 2005. "One size fits all?" *Research Policy* 34 (8):1203-19. doi: 10.1016/j.respol.2005.01.018.

- Tosun, Jale. 2014. "Absorption of Regional Funds: A Comparative Analysis." *JCMS: Journal of Common Market Studies* 52 (2):371-87. doi: doi:10.1111/jcms.12088.
- Trippl, M, B Asheim, and J Miorner. 2015. "Identification of regions with less developed research and innovation systems." *Lund University, CIRCLE - Center for Innovation, Research and Competences in the Learning Economy, 2015/36*.
- Tsipouri, L, and M Papadaku. 2005. "Profiling and assessing innovation governance in Greece: Do increased funding and the modernization of governance co-evolve? ." *In: OECD (ed.) Governance of Innovation Systems. Volume 2: Case Studies in Innovation Policy, Organisation for Economic Co-operation and Development, Paris*.
- Uyarra, Elvira. 2009. "What is evolutionary about 'regional systems of innovation'? Implications for regional policy." *Journal of Evolutionary Economics* 20 (1):115-37. doi: 10.1007/s00191-009-0135-y.
- Valdaliso, J, E Magro, M Navarro, Jose Aranguren Mari, and J Wilson. 2014. "Path dependence in policies supporting smart specialisation strategies: Insights from the Basque case." *European Journal of Innovation Management* 17 (4):390-408. doi: doi:10.1108/EJIM-12-2013-0136.
- van Ark, Bart, Mary O'Mahony, and Marcel P. Timmer. 2008. "The Productivity Gap between Europe and the United States: Trends and Causes." *The Journal of Economic Perspectives* 22 (1):25-44.
- Varblane, U, K Ukrainski, and O Lillestik. 2012. "Path Dependency Factors Affecting the Innovation Systems of Latecomer Countries: Comparison of Central and Eastern Europe, Asia, and Latin America." *in Carayannis, E., Varblane, U., and Tonu, R., (Eds), Innovation Systems in Small Catching-Up Economies New Perspectives on Practice and Policy*.
- Verspagen, Bart. 1991. "A new empirical approach to catching up or falling behind." *Structural Change and Economic Dynamics* 2 (2):359-80. doi: [http://dx.doi.org/10.1016/S0954-349X\(05\)80008-6](http://dx.doi.org/10.1016/S0954-349X(05)80008-6).
- von Tunzelmann, N. 2009. "Regional Capabilities and Industrial Regeneration." *in Farshchi, M., Janne, O. and McCann, P. (Eds), Technological Change and Mature Industrial Regions: Firms, Knowledge and Policy, Edward Elgar, Cheltenham, pp.11-28*.
- Von Tunzelmann, Nick, Jutta Günther, Katja Wilde, and Bjoern Jindra. 2010. "Interactive Dynamic Capabilities and Regenerating the East German Innovation System." *Contributions to Political Economy* 29 (1):87-110.
- Walter, Achim, Michael Auer, and Thomas Ritter. 2006. "The impact of network capabilities and entrepreneurial orientation on university spin-off performance." *Journal of Business Venturing* 21 (4):541-67. doi: <http://dx.doi.org/10.1016/j.jbusvent.2005.02.005>.
- Watkins, Andrew, Theo Papaioannou, Julius Mugwagwa, and Dinar Kale. 2015. "National innovation systems and the intermediary role of industry associations in building institutional capacities for innovation in developing countries: A critical review of the literature." *Research Policy* 44 (8):1407-18. doi: <https://doi.org/10.1016/j.respol.2015.05.004>.
- Winter, Sidney G. 2003. "Understanding dynamic capabilities." *Strategic Management Journal* 24 (10):991-5. doi: 10.1002/smj.318.
- Woolcock, Michael. 1998. "Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework." *Theory and Society* 27 (2):151-208.
- Yin, R.K. 2003a. *Applications of Case Study Research*: Sage Publications.

- . 2003b. *Case Study Research: Design and Methods*: SAGE Publications.
- . 2009. *Case Study Research: Design and Methods*: SAGE Publications.
- Zahra, Shaker A., and Gerard George. 2002. "Absorptive Capacity: A Review, Reconceptualization and Extension." *The Academy of Management Review* 27 (2):185-203.
- Zheng, Yanfeng, Jing Liu, and Gerard George. 2010. "The dynamic impact of innovative capability and inter-firm network on firm valuation: A longitudinal study of biotechnology start-ups." *Journal of Business Venturing* 25 (6):593-609. doi: <http://dx.doi.org/10.1016/j.jbusvent.2009.02.001>.

Appendices

Appendices Table 1 Early-stage Research Questions

Research Questions	
1	Why do less-favoured regions engage in S3?
2	Can the S3 concept and its evolutionary approach help improve the theoretical and analytical treatment of the complexity of RIS?
3	What innovation conditions exist and are required for S3 entrepreneurial activity to take place in less-favoured regional environments?
4	How do such innovation conditions differentiate themselves when applied at regions which represent different structural traits and R&D routines?
5	How are local specificities incorporated in S3 strategy when key conditions are missing or a strategic policy objective cannot be easily identified?
6	Can S3 approaches improve innovation dynamics in less-favoured regions with different innovation potentials?
7	What particular actions might follower regions undertake to manage the risk of weakening strategic advantage through excessive narrowing of R&D specialisation?

Source: Author

Appendices Table 2 Participant Information Leaflet

-General information-

Researcher	George Papamichail (s1258376@ed.ac.uk) <i>PhD candidate in Science and Technology Studies</i>
	The University of Edinburgh School of Social & Political Science Institute for the Study of Science, Technology & Innovation Old Surgeons' Hall High School Yards Edinburgh, EH1 1LZ
Supervisors	Dr. Alessandro Rosiello Prof. David Wield
Research subject	Capacity building and Smart Specialisation
Purpose	To investigate and understand Smart Specialisation challenges in catch-up regions
Research method	Face-to-face semi-structured tape-recorded interviews, confidential and anonymous
Ethical issues	None
Funding	ESRC The Economic and Social Research Council

-Brief statement-

Aims and objectives

The proposed PhD research is intended to examine Smart Specialisation and study its influencing attributes particularly on poor and less-advanced EU regions with the objective of overcoming theoretical and practical disconnections. Its research outputs seek to make an academic contribution through an understanding of the dynamics and evolution of structurally weaker innovation systems, and a contribution to policy through the design of an analytical and conceptual model aiming to support Smart Specialisation policymaking and implementation.

Target group and invitation

Research targets high level Smart Specialisation experts from academics, policy makers and innovation practitioners from the regions of Crete and Central Macedonia. The project seeks to address top-level experts who are currently involving in Smart Specialisation practices and undertaking a key role in designing, implementing and monitoring Smart Specialisation strategies at a regional level.

Participation and confidentiality

Participation is completely voluntary and respondents are free to withdraw at any time. There is no compensation for participation in this study. Due to confidentiality reasons **participants' views and records will be anonymised**. Respondents will have the right to ask questions during and after the interviews. All interviews will be tape-recorded and then transcribed.

Source: Author

Appendices Table 3 Informed Consent Form

You have been asked to participate in the above research study. By signing below, you are agreeing that: (1) you have read and understood the Participant Information Leaflet, (2) questions about your participation in this study have been answered satisfactorily, and (3) you are being asked for your permission to audiotape this interview and agree to take part in this research study voluntarily.

Participant's name

Participant's signature

Date

Researcher's name

Researcher's signature

Source: Author

Appendices Table 4 List of semi-structured interviews

I/N	Pseudonym	Group of interviewee	Position of interviewee	Region	Date of interview	Type of interview
1	SACr1	Private	Manager, Science and Technology Park of Crete	Crete	01.8.2014	Face2face
2	STCr2	Private	R&D Manager, FORTHnet SA	Crete	20.8.2014	Face2face
3	OICr3	Academia	Professor, University of Crete	Crete	4.09.2014	Face2face
4	RACr4	Public	Governor office, Region of Crete	Crete	12.09.2014	Face2face
5	KACr5	Private	Manager, Technical Institution, Heraklion Chamber of Commerce	Crete	30.09.2014	Face2face
6	AZCr6	Private	Manager, TÜV HELLAS, certification and inspection body	Crete	4.12.2014	Face2face
7	PACr7	Academia	Manager, Research Centre	Crete	4.12.2014	Face2face
8	STCr8	Public	S3 consultant, Region of Crete	Crete	13.12.2014	Face2face
9	TRCr9	Public	S3 consultant, Region of Crete	Crete	17.12.2014	Face2face
10	ZOCr10	Public	Regional Development Fund, Region of Crete	Crete	24.12.2014	Face2face
11	ANCr11	Academia	Professor, University of Crete	Crete	17.01.2015	Face2face
12	KACr12	Private	Heraklion Chamber of Commerce	Crete	17.01.2015	Face2face
13	MECr13	Private	R&D Manager, Plastika Kritis	Crete	17.01.2015	Face2face
14	TSCr14	Private	Entrepreneur, Olive oil sector	Crete	17.01.2015	Face2face
15	KOCr15	Private	Entrepreneur, Manufacturing sector	Crete	11.02.2015	Face2face
16	MICr16	Private	Managing Director, Pancreta bank	Crete	25.02.2015	Face2face
17	FRCr17	Private	Managing Director, Development Agency of Crete	Crete	27.02.2015	Face2face
18	KOCM18	Academia	Professor, Aristotle University of Thessaloniki	CM	6.03.2015	Telephone Skype
19	MACM19	Private	Entrepreneur,	CM	6.04.2015	Face2face

			business consultancy			
20	MACM20	Public	S3 consultant, Region of CM	CM	23.04.2015	Telephone Skype
21	KOCM21	Public	S3 consultant, Region of CM	CM	3.06.2015	Face2face
22	TSCr22	Public	S3 consultant, Region of Crete	Crete	8.07.2015	Telephone Skype
23	KYCM23	Public	S3 consultant, Region of CM	CM	13.07.2015	Telephone Skype
24	TSCr24	Academia	Technological Educational Institute of Crete	Crete	5.08.2015	Face2face
25	KOCM25	Public	S3 consultant, Region of CM	CM	3.09.2015	Telephone Skype
26	PECM26	Public	S3 consultant, Region of CM	CM	3.11.2015	Telephone Skype
27	MECM27	Private	Consultant, Intermediary organisation	CM	16.11.2015	Face2face
28	XACM29	Private	Entrepreneur, manufacturing sector	CM	17.11.2015	Face2face
29	ANCM28	Academia	Professor, Aristotle University of Thessaloniki	CM	17.11.2015	Telephone Skype
30	KACM30	Private	Science and Technology Park of Thessaloniki	CM	18.11.2015	Face2face
31	SKCM31	Private	Manager, Business and Cultural development Centre	CM	18.11.2015	Face2face
32	KACM32	Private	Business and Cultural development Centre	CM	18.11.2015	Face2face
33	GECEM33	Private	Federation of Industries of Northern Greece (FING)	CM	19.11.2015	Face2face
34	MPCM34	Academia	Professor, University of Western Macedonia	CM	19.11.2015	Face2face
35	TRCM35	Private	Alexander Innovation Zone of Thessaloniki	CM	20.11.2015	Face2face
36	VLCM36	Private	Entrepreneur, cloth and textile industry	CM	24.11.2015	Face2face
37	SOCM37	Public	General Secretariat	CM	8.12.2015	Telephone

			for Research and Technology			Skype
38	SACM38	Public	Manager, National Documentation Centre	CM	23.12.2015	Telephone Skype
39	XACM39	Private	Entrepreneur, ICT sector	CM	12.02.2016	Telephone Skype
40	KACr40	Public	Manager, Managing Authority, Region of Crete	Crete	17.02.2016	Face2face
41	KOCr41	Public	S3 consultant, Region of Crete	Crete	6.6.2017	Telephone Skype
42	KACr42	Public	Manager, Managing Authority, Region of Crete	Crete	5.7.2017	Face2face
43	SACr43	Private	Incubator Manager, EDAP SA	Crete	6.07.2017	Telephone Skype
44	DACr44	Public	S3 consultant, Region of Crete	Crete	11.07.2017	Face2face
45	SACr45	Private	Manager, Science and Technology Park of Crete	Crete	18.7.2017	Face2face
46	KACr46	Public	S3 consultant, Region of Crete	Crete	21.07.2017	Face2face
47	KACr47	Public	S3 consultant, Region of Crete	Crete	21.07.2017	Face2face
48	KACr48	Private	Manager, Technical Institution, Heraklion Chamber of Commerce	Crete	25.07.2017	Face2face
49	LYCr49	Private	Entrepreneur, Wine sector	Crete	9.8.2017	Face2face
50	SACr50	Private	Manager, Piraeus Bank local branch	Crete	11.8.2017	Face2face

Source: Author

Appendices Table 5 Observational research: list of S3 events

Event	Organiser	Date
Development Priorities for Research, Technological Development and Innovation for the 2014-2020 programming period-Regional Smart Specialization Strategy	Region of Crete	22/04/2013
S3 Platform peer-review	EU	26/09/2013
Thematic workshop on Tourism complex	Region of Crete	30/06/2015
Thematic workshop on Tourism complex	Region of Crete	18/12/2015
Youth Strategic Priority in Learning Regions: Innovative Entrepreneurship and Smart Specialization	Region of Crete	04/11/2016
Thematic workshop on Environmental complex	Region of Crete	19/12/2016
Thematic workshop on Environmental complex	Region of Crete	20/02/2017
Open meetings with local entrepreneurs (Cultural - Tourist Sector/Rural Tourism)	Region of Crete	01/03/2017
Thematic workshop on Tourism complex	Region of Crete	13/03/2017
Final consultation on the 1 st round of the environmental complex	Region of Crete	21/03/2017
Final consultation on the 1 st round of the Tourism complex	Region of Crete	04/04/2017
Thematic workshop on Agro-food complex	Region of Crete	09/06/2017
Information workshop for the Agro-food complex	Region of Crete	23/06/2017
S3 informative workshop	FORTH	21/07/2017
Final consultation on the 1 st round of the Agro-food complex	Region of Crete	03/10/2017

Source: Author

Appendices Table 6 Basic Questionnaire Guide



THE UNIVERSITY of EDINBURGH

Interview guide

- 1. Could you please give me some general information about the organisation you work for?**
E.g. Name, position, goal, main tasks, years of experience etc
- 2. Can you briefly describe the role you have in the S3 process?**
- 3. What was the main reason(s) of starting S3 beyond the *ex-ante* conditionality for getting access in the EU Structural Fund Programmes?**
- 4. When did you officially start working on S3?**
- 5. Do you have a realistic timeline for its execution/duration?**
- 6. Have you received any grants either from the public or private sector for S3?**
- 7. What do you expect from S3 strategies?**
Please explain in detail
- 8. From a general perspective, did S3 work well for your region? Do you have any examples? Please elaborate**
- 9. S3 proposes a particular philosophy. Are you familiar with it?**
For example, is it absolutely clear for you how to design, implement or monitor S3 in your region? Are all S3 process/steps clear enough for you? (e.g. design, implement, monitor, evaluate)
- 10. According to your personal view, has S3 conceptualised in a proper way? Do you see any important knowing-doing gap?**
- 11. What strategy did you follow to identify and select different participants/entrepreneurs to take part in S3?**
For example, how did you identify and contact them?
- 12. Did you cover all stakeholder groups? If not, please explain why.**
- 13. At what level are they represented**
CEOs; leaders; directors etc

- 14. How often do you meet each other in the S3 context?**
- 15. How would you evaluate the collaboration among different entrepreneurs? Please explain why.**
Effective, unproductive, rare, frequent etc
- 16. What were some barriers, if any, that you encountered during their collaboration?**
- 17. Have you met any resistance from different stakeholders' groups? If yes, what was it about? *Intellectual Property issues, confidentiality, power of politics, fear of failure, lack of time and resources etc***
- 18. How did you manage this problem?**
E.g. What kind of strategies have you used to overcome such barriers?
- 19. How would you evaluate S3 understanding of those engaged with S3 strategies?**
E.g. in terms of its rationale, philosophy, methodology etc
- 20. Could you describe what their view is around S3?**
For instance do they find it necessary, valuable, challenging, useless etc?
- 21. What effect, if any, do you feel S3 had on local stakeholders?**
For example, have key local players and stakeholders come closer to each other due to S3 practices? Have you seen any improvements in their relationship/collaboration because of S3?
- 22. Based on your own experience/view does S3 as an emerging regional innovation tool provide opportunities to support innovation-driven growth and catch up?**
- 23. Do you believe that S3 can help your region move the STI paradigm towards a more systemic and interdependent approach? If so, how? Can you give some specific examples?**
- 24. Can S3 help us understand better part of the complexity of RIS? If so, how and where? Can you give some examples from your own experience?**
E.g. understand better complexity and uncertainty about knowledge systems, institutions, proximity, absorptive and receptive capacity etc)
- 25. Would you say that people have started thinking differently about innovation in their regions because of S3?**

26. How would you assess the regional innovation system in your area?

- General: v. weak..... weak..... medium..... strong..... v. strong....

- Specific areas:

Innovation autonomy v. weak..... weak..... medium..... strong..... v. strong....

Intellectual property

Knowledge spill overs

knowledge generation-diffusion-exploitation

Funding and financing

Cluster activities

Technology cooperation

.....

27. According to your view, what general or particular conditions are required for S3 to take place properly in your region? (i.e. specific governance structure, institutional systems)

28. Was your region (e.g. all stakeholders engaged in the process) fully ready to start implementing a S3 approach? If not why?

Please explain

29. Are the existing innovation conditions in your region suitable/proper to assist the entrepreneurial process of discovery?

30. If not what else was/is missing, required or needs further improvement in all S3 stages?

Design, implementation, monitoring etc

31. Have you overcome this gap? If so, how did you manage to overcome the absence of S3 conditions? If not what actions are you going to you take?

32. Have you already identified your R&D domains to focus on? If not, why?

For example, is it because key S3 conditions are missing?

33. Was it difficult to identify and agree on specific R&D domains? If yes, why?

If so, what were the main barrier/problems/difficulties? (E.g. identification process was difficult, time-consuming etc)

34. How did you overcome the barrier(s)?

35. As you have decided on specific domains are you now worried about excessive narrowing of R&D specialisation?

36. If yes/no why? Can you explain?

37. Have you considered the need to maintain a certain level of related variety?

- 38. How can you ensure that you will avoid the risk of lock-in? If things go wrong, do you have any plan B?**
- 39. Do/will you take any particular actions to avoid potential strategic drifts?**
- 40. How do you balance the trade-off between too much and too little specialization?**
- 41. Have you established any monitoring or/and evaluation mechanisms? If yes please describe**
E.g. multi-level governance mechanisms
- 42. If no why?**
E.g. not important, never think of it, problems/difficulties to identify proper ones etc
- 43. How will you assess S3 outcome? Have you considered/identified any particular evaluation mechanism**
E.g. indicators)
- 44. Thinking about your previous answers can you give me an overall estimation of S3 as an emerging innovation tool for regional development?**
E.g. Is it successful/unsuccessful, difficult/semi-conceptualized, vague, helpful, useful, valuable, appropriate, necessary for your region etc
- 45. Before we conclude this interview, is there anything else you would like to share with me?**
E.g. other issues, recommendations etc you want to say/add

END OF INTERVIEW

Source: Author

Appendices Table 7 Basic Questionnaire Guide for longitudinal research

Questionnaire Guide

Examining the challenges that catch-up regions experience during the RIS3 implementation phase, this questionnaire guide seeks to investigate what firms- and regional-level capabilities are required to develop smart specialisation strategies in the region of Crete, as well as, what institutional arrangements and governance reforms may be useful.

1. What is the progress in the RIS3 practices (from 2012 - up to present)?
2. Do you see any notable differences in the way innovation policies are currently governed and regulated? (as compared to the past)
3. What are the main barriers/difficulties/challenges during the implementation phase for public and private sector regional actors?
 - public actors
 - private actors
4. Are there any new (or enhanced existing ones) capabilities developed during the development of RIS3 both at the firm-level and the regional-level?
5. What is strong - what is still missing?
6. Can the region of Crete support all RIS3 stages effectively at the sub-national level without the direct support of the central government?
7. Thinking of resources, competences and capabilities:
 - what is the case in the public sector (what is there, what is partly developed, what is still missing?)
 - what is the case in the private sector (what is there, what is partly developed, what is still missing?)
8. How (and in what areas) can the central government support the region to develop RIS3 effectively? What type of support (central policy intervention/action) is necessary?
9. What would be an ideal combination of top-down (national) and bottom-up (sub-national) approaches for the development of RIS3?
10. How can we achieve this reconciliation?
11. How can we achieve this reconciliation?

12. What organisational and regional-level capabilities are needed for progress towards decentralisation, what types of capacity building would be more relevant to improve regional bottom-up governance structures?
- organisational
 - regional (e.g. institutional arrangements, governance reforms)
13. Please describe the main traits of the following types of capabilities of the Private firms & local entrepreneurs and Public administration sector players separately for the period:
- up to 2012
- 2012-present (period of RIS3 development)
- Absorptive capacity
 - Technological & Innovation
 - Networking
 - Administrative
 - Entrepreneurial
 - Financial-investment
14. How can we support the development/progression of the following types of capabilities for Private firms & local entrepreneurs and Public administration sector players? What is still missing?
- Absorptive capacity
 - Technological & Innovation
 - Networking
 - Administrative
 - Entrepreneurial
 - Financial-investment

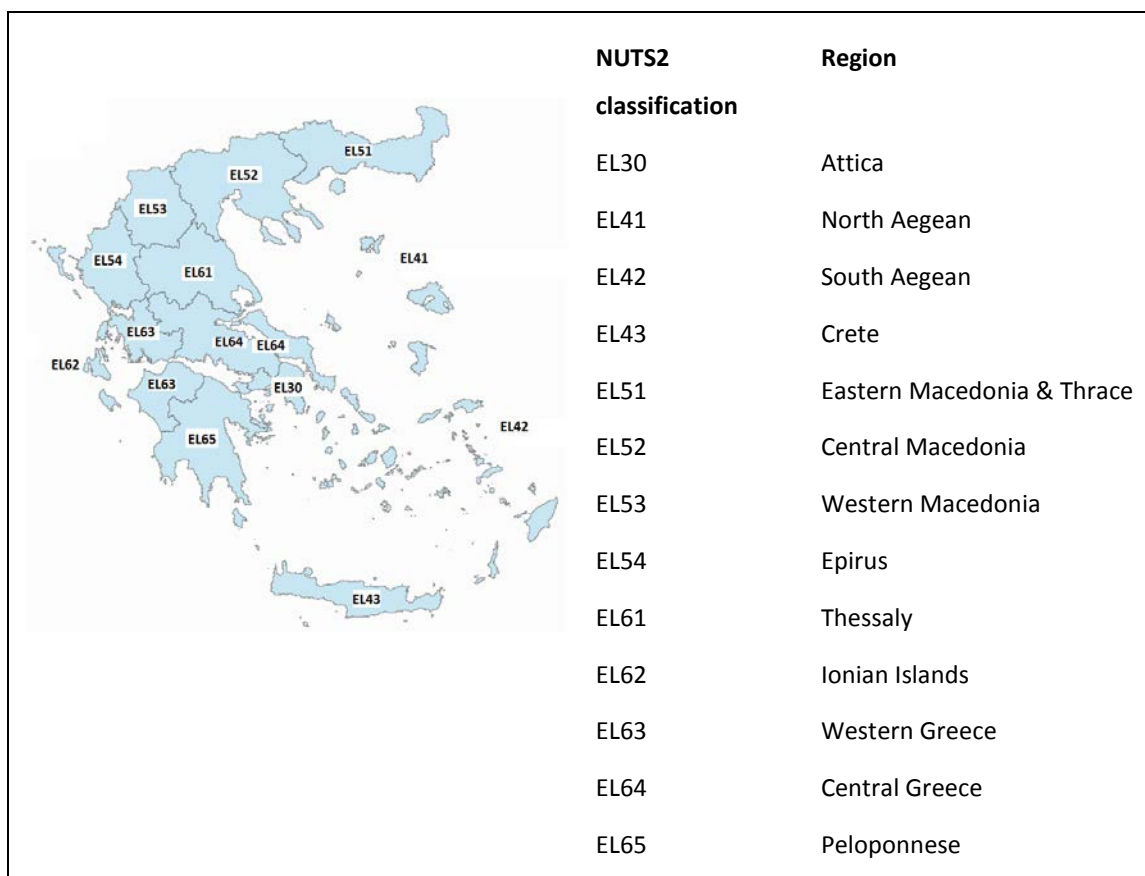
Source: Author

Appendices Table 8 List of organisations participated in the CM consultation process

Organisation
Region of CM
University of Macedonia
Geotechnical Chamber Greece
Thessaloniki Chamber of Commerce and Industry
Thessaloniki Chamber of Handicrafts
Greek International Business Association
Business and Cultural Development Centre
Federation of Industries of Northern Greece
The Centre for Research & Technology Chambers
Federation of Hellenic Associations of Young Entrepreneurs
International Hellenic University
Greek Tourism Organisation
i4G SA
Technology Park of Thessaloniki
Alexander Innovation Zone
Association of IT Companies of Northern Greece

Source: Data collocated and elaborated by the Region of CM (2015)

Appendices Figure 1 NUTS2 classification of the Greek regions



Source: Author

Appendices Table 9 Forms of capacity building for developing S3

Capacity	Competences and skills
I. Capacity to map regional dynamics	<ul style="list-style-type: none"> ▪ Assess the impact of previous innovation policy frameworks ▪ Mobilise actual engagement of local institutional bodies ▪ Competence to evaluate local actors' performance on the basis of innovation and technology (public and private)
II. Capacity for decentralisation and regional autonomy	<ul style="list-style-type: none"> ▪ Option for additional policy power of regional authorities to manage local funding regionally and reduce bureaucratic and time-consuming processes ▪ Authorisation of regional authorities to evaluate and monitor innovation policies at the regional level through the design of targeted regional indicators ▪ Provision of tax incentives in selected S3 domains at the sub-national level to promote local entrepreneurship and attract foreign direct investments

<p>III. Capacity to develop regional communication, networking and clustering</p>	<ul style="list-style-type: none"> ▪ Motivations for the mobility and attraction of specialised workforce in specific areas of regional specialisations ▪ Competences to re-build trust among different entrepreneurial actors ▪ Ability to exploit the opportunities raised from the entrepreneurial discovery to enable regional clustering and networking ▪ Ability to exploit collective and powerful local networking to fulfil S3 policy-related objectives (e.g. additional authority and autonomy at the regional level) ▪ Design and manage interactive communication platforms to facilitate inter-organisational networking, as a supplementary action in S3
<p>IV. Capacity to link cross-sectoral activities</p>	<ul style="list-style-type: none"> ▪ Ability to recognise industrial and sectoral diversity ▪ Ability to identify related but disconnected business activities for potential networking ▪ Competency to link fragmented entrepreneurial activities, using several channel linkages
<p>V. Capacity to understand & upgrade firms' technological and innovation potential</p>	<ul style="list-style-type: none"> ▪ Introduce new regional indicators to assess and understand the particularities of firm-level innovativeness Provide tailor-made support ▪ Provide tailor-made training and targeted support ▪ Assess organisational competences and knowledge skills for better policy intervention ▪ Take over large-scale initiatives for the enhancement of firms capabilities
<p>VI. Capacity to enhance local entrepreneurship</p>	<ul style="list-style-type: none"> ▪ Building up and institutionalisation of permanent technology transfer and commercialisation mechanisms ▪ Re-think internal rules and ensure elimination of internal bureaucracy to speed up the creation of start-ups and spin-offs ▪ Entrepreneurial skills training and rewards ▪ Initiation of entrepreneurship from down to top ▪ Support the creation of financial tools, e.g. VCs

Source: Author